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City of Troy, N.Y

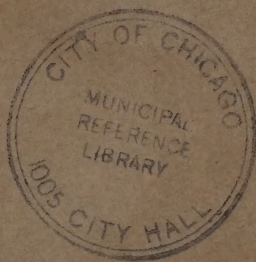
43rd Annual Report  
WATER COMMISSIONERS

Year ended Feb. 28, 1898

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FORTY-THIRD

ANNUAL REPORT

OF THE

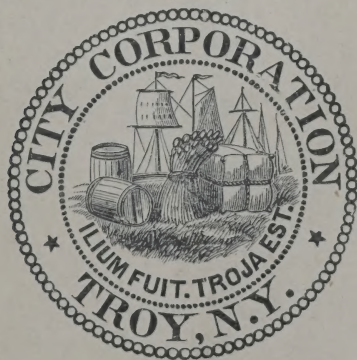
# Water Commissioners

TO THE

COMMON COUNCIL OF THE CITY OF TROY,

FOR THE

*Fiscal Year Ended February 28, 1898.*



TROY, N. Y.:

TIMES PRINTING HOUSE, BROADWAY AND THIRD STREET.  
1898.





## Water Commissioners.

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The following are the names of all who have served as Water Commissioners, together with the dates of their appointment, etc.

The first five were appointed by act of the Legislature, the remainder by the Common Council, except Mr. Briggs, who was appointed by this Board.

Name.	Appointed.	Resigned.	Died.
HARVEY SMITH,	Mar. 9, 1855.	Sept. 28, 1865.	Aug. 8, 1881
WILLIAM F. SAGE,	Mar. 9, 1855.	Oct. 2, 1862.	Oct. 22, 1870
THOMAS SYMONDS,	Mar. 9, 1855.	.....	Dec. 22, 1876
JOSEPH M. WARREN,	Mar. 9, 1855.	June 6, 1867.	Sept. 9, 1896
LIBERTY GILBERT,	Mar. 9, 1855.	Sept. 28, 1865.	Mar. 29, 1891
THOMAS SAUSSE,	Oct. 2, 1862	.....	Nov. 13, 1871
LYMAN R. AVERY,	Apr. 19, 1866:	Feb. 3, 1887.	Aug. 8, 1890
JOSEPH FALES,	Apr. 19, 1866.	.....	Feb. 22, 1893
RICHARD F. HALL,	Mar. 17, 1870.	.....	.....
GEO. D. WOTKYNs,	Nov. 6, 1876.	.....	Nov. 17, 1886
JOHN B. PIERSON,	Feb'y 1, 1877.	.....	Aug. 12, 1885
HENRY S. CHURCH,	Dec. 2, 1880.	Apr. 3, 1884.	.....
DAVID M. RANKEN,	May 6, 1884.	Oct. 3, 1890.	.....
DENNIS J. WHELAN,	Aug. 27, 1885.	.....	.....
SAMUEL O. GLEASON,	Feb'y 3, 1887.	.....	.....
DAVID C. BRIGGS,	Nov. 20, 1891.	Apr. 6, 1893.	.....
JAMES FLEMING,	Apr. 6, 1893.	.....	.....
HARRY M. ALDEN,	Apr. 6, 1893.	.....	.....

1897-1898.

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## Organization of the Board.

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### Commissioners:

SAMUEL O. GLEASON, PRESIDENT.  
RICHARD F. HALL, DENNIS J. WHELAN,  
JAMES FLEMING, HARRY M. ALDEN.

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*Regular Meetings of the Board, Friday of each week,  
at 7:30 o'clock P. M.*

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GEORGE B. FALES, CLERK.  
JOHN J. EVERS, ASSISTANT.

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EDWARD DOLAN, SUPERINTENDENT,  
JOHN H. GLEASON, ASSISTANT TO THE SUPERINTENDENT.  
WILLIAM N. RICHARDSON, FOREMAN.

---

PROFESSOR WILLIAM P. MASON, M. D., CHEMIST,  
WILLIAM G. RAYMOND, CHIEF ENGINEER, NEW SUPPLY.

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**At Pumping Station, Lansingburgh.**  
SIFROID SOUCY, ENGINEER,  
JOHN G. PRATT, ASSISTANT ENGINEER,  
PATRICK MALONEY, ASSISTANT ENGINEER.  
MICHAEL SULLIVAN, ASSISTANT ENGINEER.

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JOHN H. GLEASON, KEEPER OF THE RESERVOIRS.



# Report of the Commissioners.

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*To the Honorable, the Common Council of  
the City of Troy:*

GENTLEMEN—We present herewith to your honorable body our Forty-third Annual Report for the fiscal year ended February 28, 1898:

The Board in its membership is the same as last year. There have been no changes in the employes of the office. At the pumping station Michael S. Halpin was appointed an oiler March 5, succeeding Michael H. Keating deceased.

Alfred F. Sims, U. S. observer of the Weather bureau, Albany, has continued to furnish the office with daily and monthly details of rain-fall, which are of value to our record, covering a period of over seventy years. The daily weather map proves of much interest and the monthly summary is highly valued in completing the records of the year.

March 26 Commissioner Alden was authorized to have an examination of the Clerk's books made. The work was entrusted to Frederick P. Allen, who after a thorough and complete examination reported on May 28 the accounts correct and that the books were well and carefully kept.

April 13 a conference was held by the Board with the Mayor, having for its object an increased water supply for the city. At the following meeting, April 19, resolutions presented by Commissioner Alden were adopted authorizing Engineer Raymond to report all feasible methods for a supply of water and to make such investigation as would enable him to present a detailed estimate of costs of the several possible plans and also of the cost of filtration by various systems

and of their efficiency. He was asked to present such arguments for and against the various plans as may occur to him and of the relative values from a point of desirability and economy. Dr. W. P. Mason and Engineer Elnathan Sweet were associated with Engineer Raymond. The report was presented to the Board June 18. The results of the investigations made, in all their interesting detail, will be found in an appendix to this report.

Favored beyond the common measure with copious and timely rains, the gravity source of supply has during the past year furnished the High and Middle services with an abundance of water, besides contributing 294,285,000 gallons to the Low service. A comparison of the respective rain-falls of 1896 and 1897 in this connection may be instructive. In 1896 the rain-fall was 27.88 inches; in 1897 it was 40.79 inches, an increase of nearly 50 per cent., and about 12 per cent. above the annual average for the last 72 years. In the absence of any serious derangement of the pumping machinery, the Low service has been well maintained throughout the year, and no restriction on legitimate use of water was necessary. From the circumstance that there was an abundant supply of water on our present lines of distribution during the past year, we cannot allow ourselves to be lulled into a false security as regards the future. We deem the conditions of our present supply as extremely precarious, and although a kind providence or sheer good luck has been on our side the past year, it is presumptuous to depend on chance or a constant succession of favorable circumstances (which for the most part are beyond our control) rather than take such vigorous and reasonable measures to maintain our water supply as will ensure certainty and permanence.

We, therefore, again urge your honorable body to take such speedy action as will fully authorize this board to proceed with the work of increasing the supply in accordance with plans already submitted.



During the year seven fire hydrants and eight valves were put in. There are now in use 762 fire hydrants and 1,272 valves. The total cost of the mains laid and relaid, with hydrants and valves, was \$2,827 49. For other information and details in statistics relating to both branches of the Department's service, we would refer your honorable body to the Superintendent's report presented herewith; 194 laterals were put in, 12 by plumbers and 182 by the Department.

Nineteen permits were issued by the Superintendent to property owners for the opening of streets for the introduction and thawing out of laterals, upon filing the usual bond required by law.

A brief general statement of the financial condition of the Department is here presented :

Balance on hand March 1, 1897.....	\$2,308 90	
Regular water rents for 1897.....	75,473 69	
Collected by the Clerk.....	23,851 45	
		<hr/>
Total resources for the year.....		101,634 04
Paid interest on debt.....	\$10,897 50	
" sinking fund.....	19,137 50	
" for construction.....	2,827 49	
" general purposes.....	61,112 69	
" new supply account... ..	1,013 70	
		<hr/>
Total payments.....		94,988 88
		<hr/>
Showing balance on hand March 1, 1898,		<u>\$6,645 16</u>

The bonded debt of the city on account of its water works is at present \$273,500.

The amount of the Sinking Fund, after charging it with interest and bonds paid to date, is \$51.156 25.

The following is a statement of the amount of bills charged during the year for shop work, metered water, motor uses, special rates, masons' uses, rent, street sprinkling and ice:

Balance due March 1, 1897.....		\$4,702 05
Amount charged, 12 months .....		26,578 69
		<hr/>
		\$31,280 74
Amount paid to Clerk.....	\$23,851 45	
Amount charged in water rents.....	2,920 32	
	<hr/>	26,771 77

Balance outstanding March 1, 1898, made up as follows: Bills for metered water, \$3,007.83; shop work, \$1,355.64; special taxes, \$101.50; motors, \$44.00..... \$4,508 97

The distribution has been extended and mains laid during the year, as follows:

In Earl street northwardly, from Hoosick street main, 198 feet, 6-inch; in Belle avenue; northwardly, from Pine woods avenue main, 30 feet 6-inch; in Lake street northwardly and southwardly from Pine woods avenue main 57 feet 6-inch; in Larch street southwardly from Pinewoods avenue main, 27 feet 6-inch; in Poplar street southwardly from Pinewoods avenue main, 24 feet 6-inch; in Pine woods avenue, eastwardly, from Maple avenue, 37 feet 6-inch; in Thompson street, eastwardly, from Howard street main, 1138 feet 6-inch; in Hawthorne street, from 34 feet west of main in Pawling avenue, westwardly 742 feet 6-inch; in Fifteenth street, southwardly from Hoosick street main, 815 feet 12-inch; in Laureate avenue, from 608 feet west of main in River street, westwardly, 36 feet 6-inch; in Stannard avenue, northwardly, from main in Glen avenue, 298 feet 6-inch; in Union street, northwardly from main in Congress street, 119 feet 4 inch; an aggregate of 3,521 feet of mains laid, exclusive of 4-inch hydrant laterals, 82 feet.

The total length of all the pipe laid to date throughout the works is  $58\frac{4861}{280}$  miles.

Two hundred and seventy-eight meters, in sizes ranging from  $\frac{3}{4}$  inch to 6 inches, are now in use, and are satisfactory. The quantity of water metered for the year was 389,929,756 gallons.



The amounts collected by the Clerk for the year have, as required by law, been paid to the Chamberlain, as per receipts on file as follows:

April 1, 1897.....	\$1.454 27
May 3, ".....	973 08
June 3, ".....	3,831 16
July 6, ".....	1,578 82
Aug. 6, ".....	931 20
Sept. 3, ".....	3,945 36
Oct. 2, ".....	1,652 05
Nov. 4, ".....	1,041 56
Dec. 4, ".....	3,062 48
Jan'y 7, 1898....	739 76
Feb. 5, ".....	1,954 30
Feb. 28, ".....	2,687 41
	<hr/>
	\$23,851 45

The accompanying table will show the amounts for metered water and unpaid lateral bills which have been placed in the water rents and collected therewith annually since the law authorizing their collection in this manner has been in effect:

Year.	Meter Bills.	Lateral Bills.	Total.
1891.....	—————	\$957 65	\$957 65
1892.....	—————	1,441 84	1,441 84
1893.....	\$543 43	1,926 16	2,469 59
1894.....	2,313 75	2,121 60	4,435 35
1895.....	1,592 05	979 68	2,571 73
1896.....	2,160 55*	1,848 06	4,008 61
1897.....	1,742 98*	1,177 34	2,920 32
	<hr/>	<hr/>	<hr/>
Total.....	\$8,352 76	\$10,452 33	\$18,805 09

\*Includes \$15.00 for sprinkling permits.

The following summary of ledger balances presents the details of the receipts and expenditures for the year:

Folio.	DR.	
95	Cash account.....	\$6,645 16
53	Pumping station—boilers account... ..	712 66
55	“ “ —coal account.....	14 114 79
69	Construction account .....	2,827 49
71	Pumping station—gas account.....	745 50
77	Reservoir account.....	314 11
79	Valves and hydrants account .....	579 02
83	Pumping station—engines account....	2,224 33
85	“ “ —bldgs and grds acct .	1,068 04
89	Shop tools account.....	97 24
91	New supply account.....	1,013 70
92	Meter account.....	237 53
91	Printing and advertising account.....	215 75
100	Iron pipe account .....	2,043 82
102	Pumping station—supplies account....	470 40
104	“ “ —oil account.....	436 10
107	“ “ —tools account.....	368 55
108	Maintenance account, miscellaneous bills .....	16,508 60
110	Shop pay roll account.....	2,823 80
118	Shop supplies account.....	1,714 73
120	Pumping station—pay roll account .	15,890 09
122	Stable expenses ..	547 63
124	Chamberlain City of Troy.....	23,851 45
332	Interest account. ....	10,897 50
333	Sinking fund account.....	19,137 50
		<hr/> 125,485 49
Folio.	CR.	
32	Water rents account.....	\$75,473 69
39	Ice account.....	75 00
73	Special tax account—street sprinkling..	997 00
75	“ “ —masons' uses.....	632 05
80	Rent of buildings.....	124 00
87	Special tax account—special taxes... .	800 00
112	Shop work account.....	4,355 05
114	Special tax account—sewing machine motors .....	277 00
116	Special tax account—meters.....	16,591 35
126	Office receipts.....	23,851 45
43	Cash balance....	2,308 90
		<hr/> 125,485 49



## Income.

THE FOLLOWING IS A DETAILED STATEMENT OF THE INCOME FOR THE  
YEAR ENDED FEBRUARY 28th, 1898.

From the annual assessed water rents collected with  
the city taxes by the Chamberlain, viz:

In First District .....	\$21,862 21	
In Second District .....	22,397 10	
In Third District.....	31,214 38	
	<hr/>	\$75,473 69

From amounts collected by the Clerk, and  
by him paid over to the Chamberlain, viz:

For use of water, sprinkling streets with small hose.....	997 00	
For water used by county buildings, schools, churches and other buildings, by special and meter rates.....	17,391 35	
For water for masons' uses .....	632 05	
For water used by sewing machine motors.	277 00	
For job work and sales of material.....	4,355 05	
For rent of buildings....	124 00	
For ice.....	75 00	
	<hr/>	23,851 45
		<hr/>
		\$99,325 14
		<hr/>

NOTE—Annual water rents, 1897, as above;      \$75,473 69  
Annual water rents, 1896:

First District.....	\$22,884 99	
Second District.....	21,587 52	
Third District.....	30,368 49	
	<hr/>	74 841 00

Increase of rents over 1896 ..... 632 69

Included in the water rents were the charges for  
unpaid lateral, sprinkling and meter bills for the year,  
amounting to \$2,920 32. In premises where the supply  
is metered, only the building rate appears on the water  
rent books, the bills for water as rendered quarterly  
being payable at the office.

## Comparative Monthly Statement of Receipts From March 1, 1897, to February 28, 1898, Inclusive.

Sources.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Total
MOTORS.	\$22 00	\$16 00	\$22 50	\$24 00	\$22 00	\$23 50	\$22 00	\$24 00	\$38 00	\$36 00	\$20 00	\$17 00	\$277 00
MASONS.	77 09	8 66	11 09	44 78	4 46	185 36	81 25	67 56	99 12	31 65	13 86	6 88	632 05
RENT OF BLDGS.	.....	.....	31 00	.....	.....	31 00	..	....	31 00	.....	....	31 00	124 00
ICE.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	75 00	....	75 00
SPRINK-LING.	.....	40 00	268 00	153 00	187 00	159 00	42 00	35 00	5 00	43 00	65 00	.....	987 00
SHOP WORK.	100 46	170 22	309 72	496 93	375 05	379 82	380 24	488 01	452 67	301 34	359 01	541 58	4,355 05
METERS.	1,254 72	738 20	2,775 85	776 11	219 69	3,166 68	1,099 56	397 69	2,496 69	317 77	1,347 44	2,000 95	16,591 35
SPECIAL RATES.	.....	.....	413 00	84 00	123 00	.....	27 00	29 00	.....	20 00	74 00	30 00	800 00
WATER RENTS.	.....	.....	.....	.....	.....	.....	.....	75 473 69	.....	.....	.....	.....	75,473 69
TOTAL.	\$1,454 27	\$973 08	\$3,831 16	\$1,578 82	\$631 20	\$3,946 36	\$1,652 05	\$76,515 25	\$3,062 48	\$739 76	\$1,954 30	\$2,687 41	\$99,325 14



## Expenditures.

The payments for the fiscal year ended February 28th, 1898, (\$94,988 88), are included in the following detailed monthly statements thereof :

### March, 1897.

No. of Voucher		Amount.
1.	Monthly Pay Roll, February .....	\$334 00
2.	Weekly " " February 27.....	479 65
3.	" " " March 6.....	397 28
4.	" " " March 13.....	451 17
5.	" " " March 20.....	463 65
6.	Geo. B. Fales, clerk, disbursements .. . . .	35 63
7.	Troy Gas Co., gas at office... ..	2 30
8.	Troy Telephone & Telegraph Co., rent telephones.	90 00
9.	John H. Moon, wood.....	18 50
10.	R. F. Hall, salary, February.....	166 66
11.	Edward Dolan, Supt., one quarter's salary.....	500 00
12.	Ashcroft Mfg. Co., gauge charts .....	5 00
13.	J. M. Warren & Co., supplies... ..	44 25
14.	McLeod & Henry Co., fire brick.....	179 44
15.	Troy Gas Co., gas at P. S.....	82 22
16.	James Corr, shoeing horses .....	4 00
17.	Boutwell Milling and Grain Co., oats.. ..	11 70
18.	Knowlson & Kelley, engine repairs .....	734 10
Total.....		\$3,999 55

### April, 1897.

19.	Monthly Pay Roll, March .. . . .	\$334 00
20.	Weekly " " March 27.....	507 35
21.	" " " April 3.....	466 55
22.	" " " April 10 .....	551 00
23.	" " " April 17 .....	479 95

24.	Troy Gas Co., gas at office.....	\$4 46
25.	Thomas Nevin, teaming.....	3 00
26.	R. F. Hall, salary, March.....	166 66
27.	Geo. B. Fales, clerk, disbursements.....	14 71
28.	William Ferguson, wrought iron pipe.....	20 00
29.	Adams Ld'y Machinery Co., repairs.....	52 38
30.	Torrance Iron Co., hydrant cranks.....	4 05
31.	McCormick & Dunn, supplies.....	26 66
32.	J. J. Horan & Co., supplies.....	12 80
33.	James Corr, shoeing horses.....	5 50
34.	H. G. VanValkenburgh, hay.....	23 86
35.	Boutwell Milling and Grain Co., oats.....	11 70
36.	Bayer & McConihe, lumber.....	77 11
37.	Troy Gas Co., gas at P. S.....	63 86
Total.....		\$2,825 60

### May, 1897.

38.	Monthly Pay Roll, April.....	\$334 00
39.	Weekly " " April 24.....	486 77
40.	" " " May 1.....	643 18
41.	" " " May 8.....	796 29
42.	" " " May 15.....	708 00
43.	" " " May 22.....	629 34
44.	R. F. Hall, salary, April.....	166 66
45.	Geo. B. Fales, clerk, disbursements.....	13 55
46.	Schaghticoke Powder Co., powder.....	12 54
47.	Troy Gas Co., gas at office.....	3 78
48.	Richard Whelan, sand.....	6 00
49.	McCormick & Dunn, supplies.....	31 59
50.	D. F. Magill, supplies.....	83 03
51.	J. M. Warren & Co., supplies.....	490 15
52.	Ellen Hunt, admx., stone.....	38 44
53.	National Meter Co., meter.....	140 93
54.	J. J. Horan & Co., supplies.....	14 65
55.	Neemes Bros., castings.....	15 23
56.	Richard Carter, Jr., hydrant posts.....	75 00
57.	John H. Moon, wood.....	14 02
58.	Manufacturers' Oil and Grease Co., bearing grease and oil.....	49 96
59.	D. Klock, Jr., & Co., supplies.....	14 75
60.	J. D. Spicer & Co., lumber.....	23 92

61.	J. J. Abbott, repairs .....	\$30 25
62.	McDonnell & Bridgeman, supplies .....	90 00
63.	J. M. King & Co., taps.....	17 00
64.	Frank Hydorn, supplies.....	8 65
65.	James Corr, shoeing horses .....	10 50
66.	James Chambers, supplies.....	4 70
67.	Boutwell Milling and Grain Co., oats.....	13 55
68.	H. G. VanValkenburgh, hay.....	27 86
69.	Henry Stowell, printing.....	6 00
70.	Troy Gas Co., gas at P. S.....	58 59
71.	William J. Lloyd, removing ashes P, S.....	18 75
72.	Eddy Valve Co., supplies .....	47 00
73.	T. S. Sutherland, repairs.....	86 85
74.	Charles Millar & Son, iron pipe .....	1,274 63
Total.....		\$6,486 11

### June, 1897.

75.	Monthly pay roll, May.....	\$334 00
76.	Weekly " " May 29.....	643 93
77.	" " " June 5.....	596 22
78.	" " " June 12.....	534 88
79.	" " " June 19 .....	480 07
80.	H. Miles Nims, supplies.....	5 40
81.	Richard Whelan, sand.....	7 80
82.	R. F. Hall, salary, May.....	166 66
83.	John H. Moon, wood... ..	3 00
84.	Troy Telephone and Telegraph Co., rent.....	90 00
85.	Geo. B. Fales, clerk, disbursements.....	18 90
86.	Valentine Goetz, repairs.....	21 10
87.	Fred. P. Allen, examining books of office.....	200 00
88.	Edward Dolan, Supt., one quarter's salary.....	500 00
89.	Crandell, Knight & Reichard, coal and cement....	199 05
90.	Troy Gas Co., gas at office.....	2 16
91.	D. F. Magill, supplies .....	46 70
92.	Schaghticoke Powder Co., powder.....	12 54
93.	George Wheeler, tin roof .. ..	57 00
94.	Ludlow Valve Co., valves and hydrants.....	98 88
95.	J. J. Horan & Co., supplies.....	28 20
96.	M. F. Collins, advertising.....	2 25
97.	Troy Press Co., advertising.....	5 25
98.	National Meter Co., meter.....	65 00



99.	McCormick & Dunn, supplies.....	\$18 21
100.	J. M. Warren & Co., supplies.....	2 67
101.	James Corr, shoeing horses.....	5 00
102.	H. G. VanValkenburgh, hay.....	30 00
103.	J. D. Spicer & Co., lumber.....	25 91
104.	Wm. Kemp & Son, castings ..	9 45
105.	Troy Gas Co., gas at P. S.....	52 52
106.	Bayer & McConihe, lumber.....	22 47
107.	Eddy Valve Co., valves.....	53 00
108.	D. Klock, Jr., & Co., supplies ..	35 49
109.	Albert H. Koon, sinking test holes ..	209 10
110.	Ladies' Employment Society, rebate.....	9 00
Total.....		\$4,592 44

### July, 1897.

111.	Monthly pay roll, June.....	\$334 00
112.	Weekly " " June 26 .....	595 97
113.	" " " July 3 .....	612 40
114.	" " " July 10.....	548 10
115.	" " " July 17.....	598 26
116.	" " " July 24... ..	633 80
117.	G. W. Vandenburgh, wood.....	5 00
118.	Geo. B. Fales, clerk, disbursements.....	16 80
119.	R. F. Hall, salary, June ..	166 66
120.	D. F. Magill, supplies .....	57 10
121.	E. S. & J. K. Tobin, supplies.....	2 40
122.	Schaghticoke Powder Co., powder.....	4 50
123.	Troy Gas Co., gas at office....	3 78
124.	Jeremiah Roberts, carting dirt.....	23 40
125.	McCormick & Dunn, supplies....	19 81
126.	Richard Whelan, sand.....	18 00
127.	Joel Jaquins, pump leather... ..	2 10
128.	Levi B. Dunham, filling test pit.....	15 00
129.	William G. Raymond, services....	650 00
130.	E. Sweet, services.....	100 00
131.	Troy Gas Co., gas at P. S.....	46 71
132.	Manufacturers' Oil and Grease Co., bearing grease ..	23 52
133.	McDonnell & Bridgeman, supplies .....	142 88
134.	M. Mahony, castings.....	210 58
135.	John H. Moon, wood .....	18 80

136.	Boutwell Milling and Grain Co., oats.....	\$13 05
137.	James Corr, shoeing horses.....	5 25
138.	Ashcroft Manufacturing Co., indicator cards.....	5 00
139.	Knowlson & Kelley, repairs.....	331 56
140.	J. J. Abbott, repairs .....	14 55
141.	J. M. Warren & Co, supplies.....	458 88
142.	National Meter Co., repairs.....	7 20
143.	J. M. Francis & Son, printing annual report.....	168 75
144.	Crandell, Knight & Reichard, P. S. coal.....	1,871 22

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Total.... \$7,725 03

### August, 1897.

145.	Monthly pay roll, July.....	\$334 00
146.	Weekly " " July 31.....	640 88
147.	" " " August 7 .....	573 20
148.	" " " August 14.....	650 35
149.	" " " August 21.....	644 23
150.	Geo. B. Fales, clerk, disbursements.....	26 45
151.	R. F. Hall, salary, July....	166 66
152.	H. Miles Nims, supplies.....	7 10
153.	Troy Gas Co., gas at office... ..	95
154.	Richard Whelan, sand.....	16 80
155.	McCormick & Dunn, supplies.....	34 68
156.	Knowlson & Kelley, repairs.....	86 40
157.	William J. Lloyd, removing ashes.....	36 00
158.	Union Water Meter Co., repairs.....	9 80
159.	T. J. Hurley, printing.....	3 50
160.	J. D. Spicer & Co., lumber.....	19 00
161.	James Corr, shoeing horses .....	8 50
162.	H. McWhinnie, veterinary services... ..	10 25
163.	H. G. Van Valkenburgh, hay.....	23 72
164.	James Chambers, repairs.....	6 80
165.	McDonnell & Bridgeman, supplies.....	25 34
166.	Adams Laundry Machinery Co., repairs.....	56 82
167.	Pine & Co., supplies .....	95 83
168.	Troy Gas Co., gas at P. S....	55 62
169.	Eddy Valve Co., supplies.....	22 10
170.	Ludlow Valve Co., supplies.....	61 92
171.	Troy Press Co., printing Engineer Raymond's report.....	39 60

172.	McLeod & Henry Co., clay and sand.....	\$9 50
173.	R. D. Wood & Co., 12-inch pipe.....	542 33
174.	Crandell, Knight & Reichard, P. S. coal.....	1,070 23
Total.....		\$5,278 56

### September, 1897.

175.	Monthly Pay Roll, August ....	\$334 00
176.	Weekly " " August 28.....	639 85
177.	" " " September 4.....	637 35
178.	" " " September 11....	656 08
179.	" " " September 18.....	651 21
180.	Troy Telephone and Telegraph Co., rent....	90 00
181.	Troy Record Co., "Record" at office..	2 80
182.	D. F. Magill, supplies.....	79 25
183.	J. J. Horan & Co., supplies.....	72 00
184.	Troy Gas Co., gas at office. ....	95
185.	Geo. B. Fales, clerk, disbursements.....	12 40
186.	R. F. Hall, salary, August.....	166 66
187.	Edward Dolan, Superintendent, one quarter's salary.....	500 00
188.	M. J. Jackson & Son, paving brick.....	52 00
189.	J. D. Spicer & Co., lumber .....	21 89
190.	McCormick & Dunn, supplies. ....	20 72
191.	J. M. Warren & Co., supplies.....	125 60
192.	Lecomte Bros., flowers for P. S. ....	50 00
193.	Troy Gas Co., gas at P. S.....	59 54
194.	McLeod & Henry Co., fire brick ...	33 00
195.	Manufacturers' Oil and Grease Co., bearing grease .....	23 52
196.	John H. Moon, wood.....	6 88
197.	J. J. Abbott, repairs....	10 00
198.	Ludlow Valve Co., valve and hydrant.....	36 00
199.	M. Mahony, castings.....	124 48
200.	Valentine Goetz, painting wagons.....	100 55
201.	James Corr, shoeing horses.....	6 50
202.	H. G. Van Valkenburgh, hay.....	22 03
203.	Boutwell M. & G. Co., oats.....	26 10
204.	McDonnell & Bridgeman, supplies.....	136 98
05.	J. M. Francis & Son, advertising .....	13 75
206.	Crandell, Knight & Reichard, P. S. coal.....	2,137 30
Total ...		\$6,849 39



## October, 1897.

207.	Monthly pay roll, September.....	\$334 00
208.	Weekly " " September 25.....	612 60
209.	" " " October 2.....	666 95
210.	" " " October 9.....	626 48
211.	" " " October 16.....	603 20
212.	" " " October 23.....	617 40
213.	Geo. B. Fales, clerk, disbursements.....	12 05
214.	R. F. Hall, salary, September.....	166 66
215.	Troy Gas Co., gas at office.....	2 84
216.	McCormick & Dunn, supplies.....	20 11
217.	D. F. Magill, supplies.....	51 20
218.	J. D. Spicer & Co., lumber....	12 45
219.	Troy Gas Co., gas at P. S.....	59 54
220.	T. J. Hurley, log book P. S.....	12 50
221.	James Corr, shoeing horses.....	8 00
222.	Boutwell Milling and Grain Co., oats.....	15 75
223.	L. S. Bunnell, repairing gauges.....	18 75
224.	Alex. Ferguson, brick....	30 00
225.	John O'Connor, tin roof P. S.....	222 00
226.	Crandell, Knight & Reichard, P. S. coal.....	3,457 20
—	Bonds of May, 1879, interest to November 1, 1897..	1,500 00
—	Bonds of August, 1879, interest to August 1, 1898..	2,812 50
—	Bonds of April, 1880, interest to April 1, 1898.....	1,050 00
—	Bonds of August, 1881, interest to August 1, 1898.	525 00
—	Bonds of May, 1883, interest to November 1, 1897.	1,750 00
—	Bonds of June, 1884, interest to December 1, 1897.	2,000 00
—	Bonds of November, 1885, interest to Nov. 1, 1897.	910 00
—	Bonds of February, 1896, interest to Feb'y 1, 1898.	350 00
—	Bonds of May, 1879, annual sinking fund payment	4,000 00
—	Bonds of Aug., 1879, annual sinking fund payment	4,187 50
—	Bonds of April, 1880, annual sinking fund payment	5,950 00
—	Bonds of Aug., 1881, annual sinking fund payment	5,000 00
Total.....		\$37,584 68

## November, 1897.

227.	Monthly pay roll, October.....	\$334 00
228.	Weekly " " October 30.....	609 47
229.	" " " November 6.....	511 33
230.	" " " November 13.....	559 65

231.	Geo. B. Fales, clerk, disbursements .....	\$19 90
232.	McCormick & Dunn, supplies .....	14 93
233.	H. Miles Nims, supplies.....	3 00
234.	Troy Gas Co., gas at office.....	4 45
235.	R. F. Hall, salary, October.....	166 66
236.	D. F. Magill, supplies.....	79 80
237.	W. H. Frear & Co., supplies... ..	4 97
238.	John H. Moon, wood.....	6 00
239.	McLeod & Henry Co., clay and sand.....	9 00
240.	National Meter Co., supplies....	2 25
241.	New England Water Pipe Co., pipe.....	114 60
242.	Northern N. Y. Asphalt Paving Co., repairs, ..	68 40
243.	J. M. Warren & Co., supplies.....	78 14
244.	D. Klock, Jr., & Co., supplies.....	5 40
245.	McDonnell & Bridgeman, supplies.....	37 05
246.	Adams Laundry Machinery Co., repairs.....	2 03
247.	L. Alex. Teschan, repairs ... ..	155 49
248.	James Corr, shoeing horses.....	8 00
249.	Boutwell Milling and Grain Co., oats.....	13 50
250.	H. G. VanValkenburgh, hay.....	17 37
251.	Troy Gas Co., gas at P. S.....	66 69
252.	Adam Ross & Son, stone....	13 34
253.	Wm. J. Lloyd, removing ashes.....	44 00
254.	Charles Carr, packing .....	5 00
255.	Troy Press Co., advertising.....	8 50
256.	Eddy Valve Co., valves .....	49 50
257.	Ludlow Valve Co., valves and hydrants.....	147 50
258.	R. D. Wood & Co., iron pipe....	226 86
259.	Crandell, Knight & Reichard, P. S. coal.....	\$3,979 15
Total.....		\$7,365 93

### December, 1897.

260.	Monthly pay roll, November.....	\$334 00
261.	Weekly " " November 20... ..	536 83
262.	" " " November 27.....	464 97
263.	" " " December 4 .....	542 62
264.	" " " December 11.....	542 65
265.	" " " December 18.....	452 59
266.	" " " December 25.....	391 47
267.	Richard Whelan, sand.....	3 00
268.	E. T. Welch, gravel ..	5 20

269.	Michael O'Keefe, carting iron pipe.....	\$106 53
270.	R. F. Hall, salary, November.....	166 66
271.	Geo. B. Fales, clerk, disbursements.....	35 00
272.	Edward Dolan, Supt., one quarter's salary.....	500 00
273.	Troy Telephone and Telegraph Co., rent telephones	90 00
274.	Shaughnessy & Sons, ice.....	15 00
275.	D. F. Magill, supplies.....	51 67
276.	Troy Gas Co., gas at office.....	3 92
277.	Crandell, Knight & Reichard, coke.....	91 80
278.	J. M. Warren & Co., supplies ...	501 78
279.	William Campbell, repairs.....	10 00
280.	Lansingburgh Water Works, lateral.....	15 38
281.	McDonnell & Bridgeman, supplies....	17 90
282.	Manufacturers' Oil and Grease Co., bearing grease	23 82
283.	Eddy Valve Co., supplies.....	21 00
284.	M. Mahony, castings.....	280 88
285.	Adams Laundry Machinery Co., repairs.....	31 41
286.	Knowlson & Kelley, repairs.....	58 73
287.	F. W. Coons, copper screen.....	8 50
288.	James Corr, shoeing horses.....	8 25
289.	Boutwell Milling and Grain Co., oats.....	29 40
290.	J. J. Abbott, repairs.....	19 40
291.	P. Gawett, platforms at pier.....	80 00
292.	National Meter Co., repairs.....	7 25
293.	Troy Gas Co. gas at P. S. ....	65 07
294.	E. Wheeler, repairs ...	9 92
295.	Alex. Meekin & Co., printing.....	11 25
296.	Crandell, Knight & Reichard, P. S. coal.....	1,599 69
Total.....		\$7,133 45

### January, 1898.

297.	Monthly pay roll, December.....	\$334 00
298.	Weekly " " January 1 .....	377 88
299.	" " " January 8.....	391 50
300.	" " " January 15... ..	397 50
301.	Geo. B. Fales, clerk disbursements.....	13 67
302.	R. F. Hall, salary, December.....	166 66
303.	John H. Moon, wood... ..	17 88
304.	McCormick & Dunn, supplies.....	50 08
305.	Troy Gas Co., gas at office.....	2 70
306.	John H. Allendorph, supplies.....	6 00



307.	D. F. Magill, supplies.....	\$54 13
308.	Neemes Bros., repairs.....	3 85
309.	William Kemp & Son, castings.....	10 15
310.	McDonnell & Bridgeman, supplies.....	32 69
311.	J. J. Horan & Co., supplies.....	39 39
312.	J. D. Spicer & Co., lumber.....	16 48
313.	Ludlow Valve Co., valves.....	14 00
314.	J. M. Warren & Co., supplies.....	123 25
315.	James Corr, shoeing horses.....	8 00
316.	Boutwell Milling and Grain Co., oats.....	14 40
317.	James Chambers, repairs.....	10 20
318.	H. G. VanValkenburgh, hay.....	17 11
319.	Valentine Goetz, repairs.....	8 70
320.	McLeod & Henry Co., supplies.....	5 50
321.	Pine & Co., supplies.....	18 10
322.	Troy Gas Co., gas at P. S.....	66 56
Total.....		\$2,200 38

## February, 1898.

323.	Monthly pay roll, January.....	\$334 00
324.	Weekly " " January 22.....	394 20
325.	" " " January 29.....	383 40
326.	" " " February 5.....	375 50
327.	" " " February 12.....	382 78
328.	" " " February 19.....	385 25
329.	Geo. B. Fales, clerk, disbursements.....	14 10
330.	R. F. Hall, salary, January.....	166 66
331.	H. Miles Nims, supplies.....	5 75
332.	Troy Gas Co., gas at office.....	4 73
333.	McCormick & Dunn, supplies.....	13 82
334.	Wm. J. Lloyd, removing ashes P. S.....	36 00
335.	J. D. Spicer & Co., lumber.....	64 88
336.	Adams Laundry Machinery Co., repairs.....	10 13
337.	McDonnell & Bridgeman, supplies.....	34 20
338.	Rochester Automatic Lubricator Co., 2 lubricators.....	250 00
339.	William Kemp & Son, castings.....	1 23
340.	Charles Carr, packing.....	5 00
341.	James Corr, shoeing horses.....	4 25
342.	H. G. VanValkenburgh, hay.....	12 30
343.	Troy Gas Co., gas at P. S.....	68 58
Total.....		\$2,947 76

## Recapitulation.

March, 1897 .....	\$3,999 55
April, 1897.....	2,825 60
May, 1897.....	6,486 11
June, 1897.....	4,592 44
July, 1897.....	7,725 03
August, 1897.....	5,278 56
September, 1897.....	6,849 39
October, 1897. ....	37,584 68
November, 1897.....	7,365 93
December, 1897. ....	7,133 45
January, 1898 .....	2,200 38
February, 1898.....	2,947 76
<hr/>	
Total.....	\$94,988 88

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All the bills paid during the year are included in the above statement. In the report of the Superintendent only the cost of material actually used in the time covered by his report appears. There is also included the cost of material and labor used in the extension and re-laying of mains, (full details in Superintendent's report,) and charges for new supply account, making the total cost for construction for the year \$3,841.19, as per statement which follows:

## Construction.

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The expenditures for account of material and labor used in construction are as follows :

815 feet 12-inch pipe.....	\$521 60
2,587 feet 6-inch pipe.....	724 36
201 feet 4-inch pipe.....	32 16
7 fire hydrants.....	168 00
1 12-inch valve.....	38 00
3 6-inch valves.....	34 50
3 4-inch valves.....	21 00
7 valve boxes.....	50 75
1 24x6 tee.....	27 90
1 24-inch sleeve.....	10 44
1 12x12 cross.....	13 32
1 12x6 reducer.....	4 50
2 12x4 tees.....	15 12
1 12-inch cap.....	2 16
1 8x6 reducer.....	2 26
1 6x6 cross.....	3 76
5 6x6 tees.....	13 93
6 6x4 tees.....	19 31
2 6x4 reducers.....	3 61
2 6-inch $\frac{1}{4}$ bends.....	3 42
4 6-inch sleeves.....	5 36
7 6-inch caps.....	5 40
1 6-inch offset.....	3 65
3 6-inch plugs.....	81
3 4-inch caps.....	91
4,440 lbs. lead.....	182 04
87 lbs. yarn.....	8 70
41 bushels coke.....	6 15
Incidental expenses, cartage, &c.....	85 72
Reconnecting 3 laterals.....	16 15
535 days' labor.....	802 50
<hr/>	
Total for mains laid.....	\$2,827 49
New supply account.....	1 013 70
<hr/>	
Total.....	<u>\$3,841 19</u>



## RECEIPTS.

YEAR.	Sale of Bonds.	Assessed Rents Payable to Chamberlain.	Paid to Chamberlain by Clerk.	Total Receipts.
1855.....		\$15,324 60	\$5,520 94	\$20,845 54
1856.....		16,005 57	5,169 16	21,174 73
1857.....		16,898 47	5,043 19	21,941 66
1858.....		17,131 11	4,770 56	21,901 77
1859.....		17,962 88	5,807 97	23,770 85
1860.....		18,479 61	4,122 90	22,602 51
1861.....		18,667 28	4,050 08	22,717 36
1862.....		16 696 93	7,784 70	24,481 63
1863.....		18,692 38	7,307 42	25,999 80
1864.....		20,117 12	6,925 76	27,042 88
1865.....		20,713 02	6,584 67	27,297 69
1866.....		21,958 13	7,684 03	29,642 16
1867.....		22,962 66	9,992 27	32,954 93
1868.....		25,162 50	13,958 26	39,120 76
1869.....		26,900 37	12,514 84	39,415 21
1870.....		28,619 47	10,272 16	38,891 63
1871.....		30,474 24	14,445 15	44,919 39
1872.....		32,906 84	12,010 66	44,917 50
1873.....		36,292 75	12,259 79	48,552 54
1874.....		38,192 06	9,584 59	47,776 65
1875.....		40,795 32	9,650 26	50,445 58
1876.....		43,007 20	8,491 34	51,499 14
1877.....		46,482 68	8,569 45	55,052 13
1878.....		47,791 32	6 911 00	54,702 32
1879.....	203,153 00	48,383 10	9,720 68	261,256 78
1880.....	100,000 00	56,922 25	17,552 10	174,474 35
1881.....	50,000 00	61,273 00	18,336 44	129,609 44
1882.....		62,860 99	15,028 43	77,889 42
1883.....	50,000 00	63,708 54	17,522 79	131,231 33
1884.....	50,575 00	65 529 60	16,172 74	132 277 34
1885.....	27,734 20	65,617 42	16,416 66	109 768 28
1886.....		67,254 52	21,903 17	89,157 69
1887.....		69,336 62	20,083 64	89,420 26
1888.....		71,134 35	20,368 71	91,503 06
1889.....		63,064 03	22,446 66	85,510 69
1890.....		63,484 42	28,377 67	91,862 09
1891.....		65,339 97	26,020 06	91,360 03
892.....		66,480 02	27,030 84	93,510 86
893.....		68,817 88	24,909 58	93,727 46
1894.....		71,848 52	22,738 97	94,587 49
1895.....	10,076 50	72,461 20	23,605 78	106,143 48
1896.....		74,841 00	22,483 99	97,324 99
1897.....		75,473 69	23,851 45	99,325 14
	\$491 538 70	\$1,892,065 63	\$594,002 21	\$2,977 606 54



By deducting the total expenditures from the total resources it will be seen that the balance in the hands of the City Chamberlain at the end of the fiscal year 1897, was.....	\$6,645 16
The balance in the hands of the City Chamberlain at the end of the fiscal year, 1896, was .....	\$2,308 90
Add total receipts for fiscal year 1897, as per foregoing summary.....	99,325 14
	<hr/>
	\$101,634 04
Deduct total expenditures for fiscal year 1897 as per foregoing summary.....	94,988 88
Shows balance in the hands of City Chamberlain, Feb. 28, 1898, (as above). ....	\$6,645 16

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COMPTROLLER'S OFFICE.

TROY, N. Y., March 1, 1898.

This is to certify that I have compared the above statement of receipts and expenditures with the books of this office; that it agrees as to amount and that the balance of cash to the credit of the water works department at the close of the fiscal year, February 28, 1898, is \$6,645.16, as above reported.

JAMES W. COFFEY,  
Comptroller.

## COST OF THE WATER WORKS.

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The total cost of the water works from 1833, when they were begun, to 1855, when the present Board was organized, was as near as can be ascertained.....		\$ 175,000 00
Construction to date, March 1, 1898.....		1,106,930 20
Entire cost (March 1, 1898).....		<u>\$1,281,930 20</u>

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## DISPOSITION OF THE INCOME.

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For the last forty-three years the Common Council has annually appropriated all the surplus income of the Water Works for the extension and general improvement of the works. During that period the income has been disposed of as follows :

For salaries and maintenance.....	\$1,263,740 11
For interest on debt, { Old...\$ 70,696 07 }	338,828 57
{ New... 268,132 50 }	
For sinking fund... ..	261,462 50
For construction.....	1,106,930 20
Unexpended balance in hands of Chamberlain.....	<u>6,645 16</u>
Total .....	<u>\$ 2,977,606 54</u>



## Water Works Debt.

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The present debt of the City of Troy on account of its Water Works is due to the enlargement and extension that were commenced in 1879. It is as follows:

*First*—A series of 100 coupon bonds of \$1,000 each, dated May 1, 1879, with interest payable semi-annually at five per cent., and a provision for their payment at maturity by means of a sinking fund, created by transferring annually to the custody of the Chamberlain, out of the regular taxable water rents of the Department, the sum of \$4,000; and also an additional sum sufficient to pay the interest. Of this series the sum of \$70,000 has been paid, leaving outstanding. .... \$30,000 00

*Second*—A series of 105 coupon bonds, ninety-five of which are for \$1,000 each, and ten for \$500 each, and dated August 1, 1879, with interest at  $4\frac{1}{2}$  per cent. payable semi-annually, and a provision for their payment at maturity by means of a sinking fund created by transferring annually to the custody of the Chamberlain of Troy, out of the regular taxable water rents of the Department, the sum of \$7,000, a sufficient portion of which is to apply to the payment of the interest, and the remainder to the payment of the principal; and this annual transfer of \$7,000 is to continue until the amount in the aggregate, with the accumulations added thereto, shall be sufficient to pay said bonds and the interest thereon, when such transfer shall cease to be made. Of this series \$37,500 has been paid, leaving outstanding..... \$62,500 00

*Third*—A series of 20 coupon bonds of \$5,000 each, dated April 1, 1880, with interest payable semi-annually at  $3\frac{1}{2}$  per cent., and a provision for their payment at maturity by means of a sinking fund created by transferring annually to the custody of the Chamberlain of Troy, out of the regular taxable water rents of the Department, the sum of \$7,000, a sufficient portion of which is to pay the interest and the remainder to pay the principal; and such annual transfer of \$7,000 to continue until the amount in the aggregate shall be sufficient to pay said bonds and the interest thereon, when such transfer shall cease to be made. Of this series \$70,000 has been paid, leaving outstanding ..... \$30,000 00

*Fourth*—A series of 10 coupon bonds of \$5,000 each, dated August 1, 1881, with interest at  $3\frac{1}{2}$  per cent. payable semi-annually, and a provision for their payment by means of a sinking fund created by transferring annually, out of the taxable water rents of the Department to the custody of the Chamberlain of Troy for the use of said city, a sum sufficient in the aggregate to pay the interest of said bonds, and also the principal thereof, at such dates and times respectively as the said principal and interest shall become due and payable; and such payment to be continued annually until the aggregate amount thereof shall be sufficient to pay and discharge the said bonds and interest in full as above provided. Of this series \$35,000 has been paid, leaving outstanding ..... \$15,000 00

*Fifth*—A series of 10 coupon bonds of 5,000 each, dated May 1, 1883, with interest at  $3\frac{1}{2}$  per cent., payable semi-annually, and a provision for the payment of the principal and interest thereof out of the taxable water rents of the Department, at such times and in such amounts as the said principal and interest shall become due and payable; and such payments to be continued until all such bonds and interest shall be duly paid. The first bond of this series matures May 1, 1910, and the remainder at intervals of one year thereafter. \$50,000 00

*Sixth*—A series of 6 coupon bonds, two thereof for \$5,000 each and four thereof for \$10,000 each, dated June 2, 1884, with interest at four per cent., payable semi-annually, and a provision for the payment of the principal and interest thereof out of the taxable water rents of the Department, at such times and in such amounts as the said principal and interests shall become due and payable; and such payments to be continued until all such bonds and interest shall be duly paid ... .. \$50,000 00

*Seventh*—A series of 27 coupon bonds, dated November 2, 1885, two thereof for \$500 each and 25 thereof for \$1,000 each, with interest at 3½ per cent. payable semi-annually, and a provision for the payment of the principal and interest thereof out of the taxable water rents of the Department, at such times and in such amounts as the said principal and interest shall become due and payable; and such payments to be continued until all such bonds and interest shall be duly paid ... .. \$26,000 00

*Eighth*—A series of 10 registered bonds, dated February 1, 1896, for \$1,000 each, with interest at 3½ per cent. payable semi-annually, and a provision for the payment in each year out of the taxable water rents of the Water Works Department, to the Chamberlain of the City of Troy, a sum sufficient to pay the interest on said bonds, as the same shall become due, and also to pay the principal of said bonds at the times of their maturity; such payments to be continued until all such bonds and interest shall be duly paid..... \$10,000 00

Total debt to date..... \$273,500 00

The payments made during the past year on account of the above indebtedness, and in accordance with the stipulated conditions of issue were as follows :

On the first issue (May, 1879) one year's interest to Nov. 1, 1897, on \$30,000 at five per cent .....			\$1,500 00	
Annual sinking fund payment, .....			4.000 00	
			<hr/>	\$5.500 00
On the second issue (August, 1879) one year's interest to August 1, 1898, on \$62,500 at 4½ per cent. ....			\$2,812 50	
Annual sinking fund payment ...			4,187 50	
			<hr/>	\$7,000 00
On the third issue (April, 1880,) one year's interest to April 1, 1898, on \$30,000 at 3½ per cent. ....			\$1,050 00	
Annual sinking fund payment. ....			5,950 00	
			<hr/>	\$7,000 00
On the fourth issue (August, 1881,) one year's interest to August 1, 1898, on \$15,000 at 3½ per cent. ....			\$ 525 00	
Annual sinking fund payment. ....			5,000 00	
			<hr/>	\$5,525 00
On the fifth issue (May, 1883,) one year's interest to November 1, 1897, on \$50,000 at 3½ per cent. ....				\$1,750 00
On the sixth issue (June, 1884,) one year's interest to December 1st, 1897, on \$50,000 at 4 per cent. ....				\$2,000 00
On the seventh issue (November, 1885,) one year's interest to November 1st, 1897, on \$26,000 at 3½ per cent ....				\$910 00
On the eighth issue (February 1, 1896,) one year's interest to February 1, 1898, on \$10,000 at 3½ per cent .....				\$350 00
				<hr/>
Total payments. ....				\$30,035 00
Average rate of interest, about 4 per cent.				



## Bonded Debt.

Date of Issue.	Series.	Rate of Interest	Dates of Maturity in the order of time.	Amt's maturing at dates named.
April 1, 1880	3d	3½	April 1, 1898	\$5,000 00
May 1, 1879	1st	5	May 1, 1898	10,000 00
August 1, 1879	2d	4½	August 1, 1898	7,500 00
August 1, 1881	4th	3½	August 1, 1898	5,000 00
April 1, 1880	3d	3½	April 1, 1899	5,000 00
August 1, 1881	4th	3½	August 1, 1899	5,000 00
April 1, 1880	3d	3½	April 1, 1900	10,000 00
May 1, 1879	1st	5	May 1, 1900	10,000 00
August 1, 1881	4th	3½	August 1, 1900	5,000 00
April 1, 1880	3d	3½	April 1, 1901	10,000 00
August 1, 1879	2d	4½	August 1, 1901	7,500 00
May 1, 1879	1st	5	May 1, 1902	10,000 00
Feb. 1, 1896	8th	3½	Feb. 1, 1903	5,000 00
June 2, 1884	6th	4	June 1, 1903	5,000 00
June 2, 1884	6th	4	June 1, 1904	5,000 00
August 1, 1879	2d	4½	August 1, 1904	7,500 00
June 2, 1884	6th	4	June 1, 1905	10,000 00
June 2, 1884	6th	4	June 1, 1906	10,000 00
Feb. 1, 1896	8th	3½	Feb. 1, 1907	5,000 00
August 1, 1879	2d	4½	August 1, 1907	8,000 00
June 2, 1884	6th	4	June 1, 1908	10,000 00
June 2, 1884	6th	4	June 1, 1909	10,000 00
May 1, 1883	5th	3½	May 1, 1910	5,000 00
August 1, 1879	2d	4½	August 1, 1910	8,000 00
May 1, 1883	5th	3½	May 1, 1911	5,000 00
Nov. 2, 1885	7th	3½	Nov. 1, 1911	5,000 00
May 1, 1883	5th	3½	May 1, 1912	5,000 00
Nov. 2, 1885	7th	3½	Nov. 1, 1912	5,000 00
May 1, 1883	5th	3½	May 1, 1913	5,000 00
August 1, 1879	2d	4½	August 1, 1913	8,000 00
May 1, 1883	5th	3½	May 1, 1914	5,000 00
Nov. 2, 1885	7th	3½	Nov. 1, 1914	7,500 00
May 1, 1883	5th	3½	May 1, 1915	5,000 00
Nov. 2, 1885	7th	3½	Nov. 1, 1915	7,500 00
May 1, 1883	5th	3½	May 1, 1916	5,000 00
August 1, 1879	2d	4½	August 1, 1916	8,000 00
May 1, 1883	5th	3½	May 1, 1917	5,000 00
Nov. 2, 1885	7th	3½	Nov. 1, 1917	1,000 00
May 1, 1883	5th	3½	May 1, 1918	5,000 00
May 1, 1883	5th	3½	May 1, 1919	5,000 00
August 1, 1879	2d	4½	August 1, 1919	8,000 00

Total.....\$273,500 00

# Rain=Fall-1897='98.

ALFRED F. SIMS, U. S. OBSERVER

Days.	Jan., 1897.	February.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.	Jan., 1898.	February,
1											.40	*.01	*.36	*1.39
2			.15		.52				.60		1.66			
3			.22		.11	.15					.03	*.02		
4					.24	.30						.06	*.02	
5	.36		.23	.01	.01	.07		.23				.88	*.08	
6	.02	.01	.01	.21			.04	.06		.01				
7		.35					.01			.01		*.01	*.02	
8		.01									.09	*.02		
9			.01	1.20		1.91					.69			
10			.07	.06	.30	.04								
11							.02	1.45			.18			
12		*.80	.06		.29	.01	.57	.01		.70	.43	.45	.02	
13		*.12			1.80	.10	.49		.12	.11			.03	
14			.04	.02	.01	.23	3.11					.87		*.03
15	*.02	.01		.67	.14	.01	.01	.13			.01	1.12	*.12	*.17
16			.01	.01							*.18		*.01	*.53
17	.01			.38							*.01			
18	.02	.01	.01								*.01	*.01		.02
19			.01	.02				.31			*.15			
20			.76				.08	.10	.82		*.06	*.18	*.92	.80
21	*.22	.01	.04		.17			.05			*.02	.02	.02	.36
22		*.02					.52	.43		.01				*.15
23		*.71					.23		.04		*.20	*.04	*.46	*.06
24			.33	.01	.21	.34	.01	1.71	.18					*.02
25				.04	.52		.06				*.06		*.08	*.04
26				.09	.01		.02		.06		.05		*.66	
27					.16		.02				.38			
28	.01			.40	.14		.84			.09				
29	*.96				.06	.04	.64			.08	*.07		*.01	
30						1.25						*.05		
31												*.64	*.15	
Total	1.62	2.05	1.85	3.12	4.69	4.45	6.67	4.43	1.87	1.01	4.65	4.38	2.96	3.57

Total for 1897, 40.79 inches.

\*Melted snow.

## METEOROLOGICAL REGISTER CONDENSED.

FROM JANUARY 1, 1826, TO DECEMBER 31, 1897, BOTH INCLUSIVE.

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Total Fall.
1826..	2.42	1.64	2.56	1.77	.93	7.45	4.62	1.14	3.90	2.22	1.52	1.99	32.16
1827..	5.18	2.42	2.24	3.98	3.21	3.64	4.28	4.88	4.27	4.32	4.19	4.20	46.81
1828..	1.89	1.89	1.17	2.50	4.41	4.25	5.15	1.24	7.97	1.58	5.65	.21	37.91
1829..	4.68	3.19	2.49	4.92	3.26	3.48	3.23	1.61	2.92	2.78	3.77	2.01	38.34
1830..	.97	1.44	4.97	2.09	3.46	8.23	3.92	2.05	2.11	2.55	5.48	3.40	40.67
1831..	1.62	2.01	2.36	5.18	2.75	3.98	3.93	3.41	3.92	5.20	2.31	1.16	37.83
1832..	4.52	5.52	1.99	3.11	4.17	3.23	5.13	4.41	2.37	4.00	3.55	3.83	45.83
1833..	2.92	2.85	1.91	.87	7.86	3.12	4.08	3.50	3.50	8.40	3.67	1.55	44.23
1834..	.95	.33	1.82	2.52	3.04	2.87	3.24	1.53	1.99	4.02	.80	2.60	25.71
1835..	.25	1.30	.17	1.52	1.86	4.83	2.10	4.10	.95	1.96	2.11	1.00	22.15
1836..	4.93	2.70	1.25	1.60	2.38	4.69	1.93	1.57	1.61	4.40	2.45	4.07	33.58
1837..	1.78	2.08	2.31	2.26	4.74	4.65	5.50	2.46	1.55	2.47	1.77	1.77	33.34
1839..	1.00	.15	.58	1.24	.92	2.65	2.19	.92	2.59	1.70	1.12	3.26	18.32
1840..	1.90	2.85	3.08	3.52	.20	1.93	1.98	2.55	2.01	3.48	2.41	3.30	29.21
1841..	2.30	.92	1.75	1.50	1.69	2.00	1.29	3.30	4.10	.85	2.87	5.27	27.84
1842..	2.25	1.00	2.06	4.43	.90	3.17	2.40	3.35	2.90	1.95	1.20	3.95	29.56
1843..	1.80	1.90	3.45	2.90	.73	4.10	2.45	5.10	2.80	4.05	2.20	1.40	32.88
1844..	.81	1.95	1.15	.50	4.35	3.45	3.60	1.45	1.10	3.05	1.65	1.40	24.46
1845..	2.20	1.60	3.00	1.50	2.50	2.35	4.10	2.50	4.35	2.05	2.10	2.50	30.75

## METEOROLOGICAL RECORD—CONTINUED.

Years.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Total Fall.
1846..	1.50	3.70	2.95	.25	2.37	4.41	6.02	1.38	3.50	2.83	5.59	2.98	37.48
—	—	RECORD WANTING.			—	—	—	1.49	4.27	3.64	1.76	4.17	15.33
1848..	2.27	1.81	1.99	.78	6.01	2.91	6.36	3.47	2.99	3.45	1.91	4.69	38.64
1849..	.82	.80	2.58	.90	4.60	5.06	1.15	4.87	1.26	6.98	2.53	2.18	33.73
1850..	2.65	1.87	.45	2.86	5.40	3.20	5.98	3.07	5.08	4.41	2.42	3.47	40.86
1851..	.67	3.86	.65	3.28	2.33	4.26	4.66	1.68	1.08	2.46	4.61	.29	29.83
1852..	2.54	1.11	2.73	4.29	2.41	1.86	3.19	2.48	1.35	3.04	4.09	2.80	31.89
1853..	1.12	3.53	2.20	3.55	6.36	1.75	3.74	3.71	6.10	3.17	3.33	1.60	40.16
1854..	2.46	2.50	2.49	5.83	1.87	3.05	2.58	1.09	2.28	2.49	2.30	2.08	31.02
1855..	2.37	1.46	.59	3.27	1.94	6.05	4.42	4.05	1.55	9.42	3.37	3.74	42.23
1856..	1.00	.23	1.22	2.31	5.15	3.44	1.74	11.09	4.00	1.16	2.75	2.70	36.79
1857..	2.50	1.78	1.05	6.36	3.70	4.93	3.51	3.64	2.22	3.31	1.94	3.87	38.51
1858..	2.00	1.63	.61	2.68	3.35	2.67	9.19	2.98	2.31	3.10	3.09	2.67	36.28
1859..	3.13	1.94	2.99	3.38	2.19	4.27	2.92	2.53	4.55	1.22	3.48	3.77	36.37
1860..	.41	1.61	2.35	1.38	2.46	3.54	4.34	8.46	4.39	2.24	3.64	2.30	37.12
1861..	3.47	2.60	3.68	6.28	3.82	1.64	4.95	4.59	3.14	3.20	2.72	1.65	41.74
1862..	5.33	2.07	3.77	1.83	.91	7.67	4.25	2.27	.84	3.72	4.32	1.54	38.52
1863..	4.92	2.51	4.04	1.38	5.55	2.04	7.66	7.24	1.62	2.32	5.02	4.10	48.40
1864..	1.61	.86	3.50	4.62	2.43	.62	1.06	5.69	2.72	2.68	3.68	3.92	33.30
1865..	2.27	1.96	4.84	2.87	5.97	1.98	3.62	.93	2.14	3.88	2.67	1.38	34.51



## METEOROLOGICAL RECORD—CONTINUED.

Year.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Total Fall.
1866..	1.35	1.70	1.08	1.45	2.43	6.71	3.85	3.18	4.73	1.68	2.94	.66	31.76
1867..	2.42	1.91	2.26	3.20	5.75	3.24	3.41	7.29	1.50	3.20	1.64	1.24	37.06
1868..	3.33	.86	2.06	3.79	6.33	3.20	2.35	3.85	8.48	1.58	4.94	1.64	42.41
1869..	3.99	3.33	3.81	2.72	2.04	5.79	2.49	1.76	3.45	13.80	.58	4.24	48.05
1870..	4.47	5.08	3.59	2.42	1.44	5.65	5.01	5.56	3.01	2.87	1.82	1.06	41.98
1871..	1.60	1.64	3.85	2.40	3.05	4.81	7.24	8.92	1.78	2.37	2.24	1.80	41.70
1872..	.78	1.74	2.70	1.81	4.79	4.68	5.60	4.84	2.55	4.68	2.77	2.18	39.12
1873..	3.32	2.11	3.65	1.99	1.98	.99	5.97	2.27	4.78	5.57	3.75	3.03	39.41
1874..	3.96	3.76	1.86	5.37	2.27	7.22	6.23	.77	2.78	1.76	2.55	.84	39.37
1875..	2.21	1.65	3.46	2.79	2.15	3.67	4.40	4.78	2.42	5.44	2.25	1.20	36.42
1876..	1.57	4.09	4.28	3.51	2.96	4.40	4.97	.53	5.17	1.64	2.65	2.42	38.19
1877..	1.94	.34	2.66	2.13	1.55	4.52	5.00	2.06	1.13	7.84	3.14	.59	32.90
1878..	4.01	3.72	1.94	4.53	4.60	4.68	6.12	3.80	2.63	3.32	5.18	4.70	49.23
1879..	2.72	2.23	3.82	2.90	.65	7.42	5.82	3.60	3.55	1.80	3.53	4.22	42.26
1880..	2.80	1.87	1.20	2.07	3.03	1.09	3.04	2.76	2.88	2.43	2.49	1.99	27.65
1881..	2.86	2.50	3.80	1.34	3.90	3.76	2.22	2.07	2.38	3.19	3.44	4.88	36.34
1882..	2.64	3.31	1.79	1.27	4.15	3.98	3.97	1.38	7.79	.27	.97	2.24	33.76
1883..	2.43	3.00	1.77	2.65	3.20	6.30	5.96	3.69	3.19	3.49	1.14	2.55	39.37
1884..	2.98	3.85	4.00	2.09	2.79	1.80	5.04	5.27	1.80	2.64	3.44	3.20	38.90
1885..	3.09	1.38	.62	2.89	1.92	1.98	1.98	7.58	2.00	5.54	3.90	1.51	34.39

## METEOROLOGICAL RECORD—CONCLUDED.

Years.	Jan.	Feb.	March.	April.	May.	June.	July.	August.	Sept.	Oct.	Nov.	Dec.	Total Fall.
1886..	3.66	1.40	2.73	3.67	3.40	3.19	2.56	.87	2.51	2.43	5.40	2.19	34.01
1887..	3.02	2.86	2.90	2.49	2.27	2.99	4.61	4.61	1.94	2.22	4.36	5.43	39.70
1888..	3.04	2.07	5.62	1.95	2.98	3.18	2.52	4.74	4.68	6.10	4.48	3.30	44.66
1889..	2.82	1.81	1.76	1.25	3.32	6.43	4.19	3.63	3.68	3.48	5.00	2.14	39.51
1890..	2.28	2.52	3.72	1.64	5.19	2.72	2.37	5.66	8.91	5.76	1.18	2.94	44.89
1891..	6.12	4.14	3.12	2.27	1.69	2.65	6.11	5.88	1.94	2.13	2.40	3.23	41.68
1892..	4.08	2.13	1.64	.56	5.30	4.41	4.22	6.70	2.08	.60	2.29	.82	34.83
1893..	1.31	4.63	2.00	2.10	5.08	2.92	1.82	7.21	3.20	1.67	.91	2.54	35.39
1894..	2.54	2.61	.85	2.02	4.64	3.29	2.96	2.26	4.18	4.62	1.96	3.18	35.11
1895..	1.65	1.63	1.31	3.09	1.72	1.72	4.02	3.14	1.80	2.35	4.78	2.59	29.80
1896..	.98	4.03	4.66	.98	1.55	2.49	3.57	2.25	3.31	1.53	1.80	.73	27.88
1897..	1.62	2.05	1.85	3.12	4.69	4.45	6.67	4.43	1.87	1.01	4.65	4.38	40.79
Total.	175.00	157.57	171.35	184.47	224.99	265.45	282.75	255.12	222.40	238.76	210.61	184.43	2,572.90
Avg.	2.50	2.25	2.45	2.63	3.21	3.79	4.04	3.59	3.13	3.37	2.97	2.60	36.53

LOCATION, SIZE AND LENGTH  
OF  
**Street Water Mains.**

(IN ALPHABETICAL ORDER.)

The following embraces a complete schedule, revised to date, of all the water mains (exclusive of service laterals) laid in the city by the Troy Water Works to the present time :

STREET.	FROM AND TO.	FEET.
Adams Street :		
8 in.—	46 feet west of River street, main in Hill street .....	1,836
Alder avenue :		
6 in.—	Main in Maple avenue, main in Locust avenue .....	564
Alley between River and First streets :		
6 in.—	Main in Congress street, main in Ferry street	410
1½ in.—	" Liberty street, southwardly. ....	80
1½ in.—	" Washington street, southwardly....	120
6 in.—	" Adams street, northwardly....	243
Alley between River and Second streets :		
6 in.—	Main in Polk street, main in Main street. ...	577
Alley between First and Second streets :		
6 in.—	Main in Broadway, main in State street. ....	476
1½ in.—	" State street, southwardly.....	180
6 in.—	" Ferry street, main in Division street.	504

STREET.	FROM AND TO.	FEET.
Alley between Second and Third streets :		
1½ in.—Main in River street, southwardly.....	80	
6 in,— “ Broadway, main in Division street..	1,881	
4 in.— “ Division street, main in Liberty street .....	282	
6 in.—Main in Liberty street, main in Washington street .....	349	
Alley between Third and Fourth streets :		
4 in.—Main in Fulton street, southwardly .....	380	
1½ in.— “ Broadway, northwardly.....	80	
6 in.— “ Broadway, main in State street.....	466	
Alley between Fourth street and Fifth avenue :		
1½ in.—Main in Broadway, southwardly.....	235	
1½ in.— “ State street, southwardly.....	80	
1½ in.— “ Congress street, southwardly.....	220	
6 in.— “ Madison street, main in Hanover street .....	1,016	
Alley between Fifth and Sixth avenues :		
6 in.—Main in Fulton street, main in Grand street.	392	
4 in.— “ Congress street, northwardly.....	119	
Alley between Sixth and Seventh avenues :		
6 in.—Main in Fulton street, main in Grand street..	342	
6 in.— “ Broadway south, main in alley north of State street .....	280	
6 in.—Main in Hill street, northwardly.....	36	
4 in.—36 feet north of Hill street main, northwardly	183	
Alley north of State street :		
6 in.—Main in Sixth avenue, main in Seventh avenue.....	300	
Alley north of Ferry street :		
3 in.—Main in Seventh avenue, eastwardly ...	118	
4 in.—118 feet east of Seventh avenue main, eastwardly.....	190	
4 in.—308 feet east of Seventh avenue main, southwardly, main in Ferry street.....	106	



STREET.	FROM AND TO.	FEET.
Balsam avenue :		
6 in.—Main in Pawling avenue, westwardly .....		54
Bank street :		
6 in.—304 feet east of main in Brunswick avenue, main in Prospect avenue.....		776
Bedford street :		
6 in.—Main in Hanover street, southwardly.....		200
Belle avenue ;		
6 in.—Main in Pine Woods avenue.....		30
Berger lane :		
8 in.—Main in Defreest avenue, creek.....		258
Bleecker avenue :		
6 in.—Main in Tibbits avenue, main in Highland avenue.....		470
Bond street :		
6 in.—Main in River street, west side of Turner street .....		530
Broadway :		
6 in.—Main in River street, west to blow-off.....		200
8 in.— " River street, main in Seventh ave. . .		1,845
3 in.— " Seventh ave., main in Institute ave. .		163
Brunswick avenue:		
20 in.—Main in Congress street, main in Tibbits ave. .		1,138
Brunswick turnpike:		
8 in.—Main in Congress street, city line.....		591
Burden avenue:		
12 in.—Main in Main street, north end Wynantskill bridge.....		1,545
8 in.—Blow-off into creek at bridge.....		21
8 in.—North end of bridge, junction with Water st. .		600
6 in.—Junction with Water street, south and east... .		843
8 in.—843 feet from main in Water street, junction at Vandenberg avenue.....		1,455

STREET.	FROM AND TO.	FEET.
Burdett avenue:		
20 in.—	North line of Hoosick street, main in Tibbits avenue.....	5,000
Campbell highway:		
12 in.—	Main in Spring avenue, main in Vandenburg avenue.....	5,793
Canal avenue:		
12 in.—	At First street bridge.....	6
6 in.—	“ “ “ .....	16
6 in.—	At Second street bridge.....	32
12 in.—	At Third street bridge.....	61
6 in.—	At Fourth street bridge....	24
8 in.—	“ “ “ .....	16
Chestnut street:		
6 in.—	Main in Elm street, northwardly.....	400
Center street:		
6 in.—	Main in Burden avenue, railroad.....	192
Cemetery avenue:		
6 in.—	Main in Sixth avenue, main in River street...	318
Christie street:		
6 in.—	Main in Congress street, main in Seventeenth street.....	1,018
Collins avenue:		
6 in.—	Main in Pawling avenue, main in Maple avenue.....	1,200
Congress street:		
8 in.—	Main in River street, Hudson river.....	250
10 in.—	Main in River street, west side of Sixth avenue	2,012
4 in.—	East side of Sixth avenue, main in Seventh avenue.....	150
8 in.—	Main in Seventh avenue, main in Eighth street.....	484
12 in.—	Main in Eighth street, main in Brunswick avenue.....	3,533

STREET.	FROM AND TO.	FEET,
12 in.—Connecting main on Marshall estate with main in Congress street, east of Cypress street .....		69
20 in.—Main in Brunswick avenue, north end stone bridge .....		347
Cragin avenue:		
6 in.—Main in Glen avenue, southwardly.....		610
Cross street:		
6 in.—Main in Stow street, southwardly.....		702
Cypress street:		
6 in.—Main in Congress street, southwardly.....		917
Defreest avenue:		
8 in.—Main in Campbell highway, main in Berger lane .....		565
Division street:		
6 in.—Main in Fourth street, Hudson river.....		1,687
Douw street:		
4 in.—Main in River street, westwardly blow-off...		635
6 in.—“ River street, east line of Seventh ave.		516
Eagle street:		
6 in.—8-inch main in Eighth street, 147 feet east of Ninth street ....		406
6 in.—Main in Twelfth street, 96 feet east of Fifteenth street.....		880
Earl street:		
6 in.—Main in Jacob street, 198 feet north of main in Hoosick street.....		1,670
6 in.—Main in North street, 6 feet south of Rensselaer street.....		871
Eighth street:		
20 in.—North line of Middleburgh street, center of Federal street .....		4,630
16 in.—Center of Federal street, main in Congress street.....		2,052

STREET.	FROM AND TO.	FEET.
8 in.—Main in Hoosick street, 240 feet south of Fulton street.		3,167
Eleventh street :		
6 in.—112 feet south of Jacob street, 77 feet north of Eagle street		612
6 in.—Main in Middleburgh street, main in Ingalls avenue.		450
Elm street, Fifth ward :		
6 in.—Main in Chestnut street, main in Cypress street.		193
Elm street, Sixth ward :		
6 in.—Main in Water street, south city line.		241
Elm Grove avenue :		
6 in.—Main in Pawling avenue, eastwardly.		395
Erie street :		
8 in.—Main in Mill street, main in Snyder avenue.		649
Factory road :		
6 in.—Main in Mill street, eastwardly.		382
Farm street :		
6 in.—Main in Congress street, main in Fourteenth street		1,049
Federal street :		
8 in.—Main in River street, west side Front street.		224
20 in.—“ River street, main in Eighth street.		1,335
16 in.—“ Eighth street, main in Ninth street.		257
Ferry street :		
6 in.—Main in Fourth street, main in Front street.		1,507
8 in.—“ Fourth street, main in Fifth avenue.		342
6 in.—“ Fifth avenue, main in Seventh ave.		506
8 in.—“ Seventh avenue, junction with Congress street.		1,048



STREET.	FROM AND TO.	FEET.
Fifteenth street :		
12 in.—Main in Congress street, 12 feet north of South street .....		1,601
6 in.—Main in Jacob street, 132 feet north of main in Hutton street.....		929
12 in.—Main in Hoosick street, southwardly.....		815

## Fifth avenue :

8 in.—148 feet north of Rensselaer street, main to Jacob street.....	2,841
6 in.—Main in Jacob street, 26 feet south of Liberty street.....	3,944
5 in.—125 feet north of Washington street, junction with Hill street.....	509
6 in.—Main in Adams street, main in Ida street ...	968
6 in.—South line Canal avenue, main in Madison street.....	457

## First street :

12 in.—Main in River street, center Canal avenue...	4,116
6 in.—Center of Canal avenue, junction with Second street .....	3,786

## Fourth street :

20 in.—Main in Federal street, main in Ida street...	5,291
8 in.— " Ida street, center of Canal avenue..	186
6 in.—Center of Canal avenue, main in Madison street .....	480
16 in.—Main in Madison street, main in Main street.	3,953
4 in.— " Jackson street, brewery.....	200
8 in.— " Division street, southwardly, sewer.	55

## Fourteenth street :

8 in.—Main in Hutton street, main in People's avenue .....	1,255
6 in.—Main in Hutton street, northwardly.....	186
8 in.— " South street, junction with Marshall street .....	1,237

## Frear avenue :

4 in.—Main in Oakwood avenue, westwardly.....	552
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STREET.	FROM AND TO.	FEET.
Front street :		
6	in.—Main Federal street, main in Fulton street...	812
6	in.—At Congress street .....	12
6	in.—Main in Ferry street. northwardly .....	143
Fulton street :		
6	in.—Main in Front street, main in River street..	195
8	in.—“ River street, main in Eighth street..	1,651
8	in.—16-inch main in Eighth street, sewer .....	22
Glen avenue :		
6	in.—Main in River street, Hudson river.....	644
20	in.—“ River street, main in Seventh avenue	615
24	in.—“ Seventh avenue, lower distributing reservoir.....	2,168
6	in.—On blow-off from 30-inch pipe.....	18
6	in.—On blow-off from 24-inch pipe .....	16
Grand street :		
6	in.—Main in River street, westwardly, blow-off...	226
10	in.—“ River street, east side Sixth avenue.	772
6	in.—East side of Sixth ave., main in Seventh ave.	299
8	in.—Main in Seventh ave., Main in Eighth street.	364
Grant avenue :		
6	in.—Main in Sherman avenue, main in Thomas street.....	654
Hanover street :		
6	in.—Main in Fourth street, orphan asylum.....	420
Havermans avenue :		
4	in.—Main in Liberty street, southwardly.....	1,090
Harrison Place :		
6	in.—Main in Federal street, main in Jacob street.	753
3	in.—“ Jacob street, northwardly.....	445
4	in.—445 feet north of Jacob street main, north- wardly .....	117
Harrison street :		
6	in.—Main in Fourth street, east line, west line...	60
6	in.—“ Second street, east line, west line...	59
6	in.—“ First street, east line, west line....	60

STREET.	FROM AND TO.	FEET.
Hawthorne street :		
6 in.—Main in Pawling avenue, westwardly.....		776
Highland avenue :		
6 in.—Main in Seventeenth street, city line....		1,173
High service :		
20 in.—Reservoir, north line of Hoosick street.....		4,468
Hill street :		
6 in.—Main in Liberty street, junction with Spring avenue.....		2,843
Hoosick street :		
10 in.—Main in River street, main in Fifth avenue..		282
8 in.—“ Fifth avenue, 20-inch main in Eighth street.....		842
12 in.—20-inch main in Eighth street, main in Bur- dett avenue.....		3,130
House avenue :		
6 in.—Main in Ninth street, eastwardly.....		340
Howard street :		
8 in.—Main in Erie street, main in Thompson street ...		526
Hopkins street :		
6 in.—Main in Thompson street, main in Mechanic street. ....		257
Hutton street :		
8 in.—Main in River street, Hudson river.....		160
6 in.—“ River street, main in Seventh ave.		864
8 in.—8-inch main in Eighth street, main in Four- teenth street ...		1,578
6 in.—Main in Fourteenth street, main in Seven- teenth street .....		785
Ida street :		
6 in.—24 feet west of First street, westwardly to railroad.....		184

STREET.	FROM AND TO.	FEET.
8 in.—	24 feet west of First street, main in Third street .....	710
20 in.—	Main in Third street, main in Fourth street	333
8 in.—	“ Fourth street, east side of Sixth ave.	650
6 in.—	East side of Sixth avenue, main in Seventh avenue.....	460
Ingalls avenue :		
8 in.—	Main in River street, Hudson river.....	275
12 in.—	“ River street, corner Sixth avenue...	273
6 in.—	“ Sixth avenue, 10 feet east of 20-inch main in Eighth street .....	684
6 in.—	Main in Ninth street, main in Eleventh street.	514
Institute avenue :		
4 in.—	Main in Broadway, southwardly.....	273
Jackson street :		
6 in.—	188 feet west of First street, main in Second street. ....	541
4 in.—	Main in Second street, main in Fourth street.	520
Jacob street :		
6 in.—	Main in River street, west side of Seventh avenue....	882
8 in.—	West side of Seventh avenue, 20-inch main in Eighth street .....	323
6 in.—	8-inch main in Eighth street, west side Sixteenth street .....	2,067
Jay street :		
6 in.—	Main in Fifth avenue, main in Sixth avenue.	330
Jefferson street :		
6 in.—	Main in First street, main in Hill street.....	1,691
Kelly street :		
6 in.—	Main in Burden avenue, main in Cross street ..	230
King street :		
6 in.—	Upper junction with River street, south line of Jacob street.....	482



STREET.	FROM AND TO.	FEET.
3 in.—South line of Jacob street, lower junction with River street .....		546
Lansing avenue:		
6 Main in Walker avenue, main in Maple avenue...		620
Lake street:		
6 in.—Main in Pine Woods avenue, north line, south line .....		57
Larch street:		
6 in.—Main in Pine Woods avenue, southwardly...		27
Lark street:		
8 in.—Main in Vandenburg avenue, junction with Berger lane.....		282
6 in.—Main in Berger lane, south city line.....		180
Laundry Place:		
3 in.—Main in King street, eastwardly 100 feet, then southwardly 175 feet.....		275
Liberty street:		
6 in.—East side Front street, main in Fifth avenue.		1,853
4 in.—Main in St. Mary's avenue, main in Haver- mans avenue .....		126
Lincoln avenue:		
8 in.—Main Fourth street, eastwardly.....		955
Linden avenue:		
6 in.—Main in Pawling avenue, Marshall Infirmery		1,116
Locust avenue:		
6 in.—Main in Pawling avenue, westwardly.....		775
Low service main:		
24 in.—Reservoir, junction of 12-inch and 20-inch..		1,394
20 in.—Junction of 24-inch, north line of Middle- burgh street at Eighth street.....		1,700
12 in.—Junction of 24-inch, main in Ingalls avenue.		1,650

STREET.	FROM AND TO.	FEET.
Madison street :		
6 in.—	218 feet west of River street, main in First street .....	575
8 in.—	Main in First street, main in Third street...	682
16 in.—	" Third street, main in Fourth street..	330
6 in.—	" Fourth street, main in Fifth avenue.	333
Main street :		
8 in.—	Main in Fourth street, main in Second street.	39
4 in.—	" Second street, westwardly to rail-road .....	280
Mann avenue :		
6 in.—	Main in Fourth street, eastwardly .....	576
Maple avenue :		
6 in.—	Main in Pine Woods avenue, main in Pawling avenue .....	1,671
12 in.—	Main in Pawling avenue, main in Spring ave .....	1,215
Marshall street :		
6 in.—	Main in Fifteenth street, main in Fourteenth street .....	266
8	Junction of Fourteenth street, main in Congress street .....	182
6 in.—	Main in Congress street, main in Chestnut street .....	332
Mechanic street :		
6 in.—	Main in Howard street, main in Hopkins street .....	350
Middleburgh street :		
12 in.—	Main in River street, main in Sixth avenue..	432
24 in.—	" Sixth avenue, main in Seventh ave..	220
12 in.—	" Seventh avenue, main in Oakwood avenue .....	1,486
Middle Service Main :		
20 in.—	Main in Oakwood avenue, 63 feet south of Frear avenue, Middle Service reservoir...	1,553

STREET.	FROM AND TO.	FEET.
Mill street :		
8 in.—Main in Burden avenue, main in Vandenburg avenue .....		2,511
Monroe street :		
8 in.—357 feet west of River street, main in alley east of Fourth street .....		1,857
Mount street :		
6 in.—Main in North street, southwardly.....		31
4 in.—31 feet north of main in North street, main in Ingalls avenue.....		689
Myrtle avenue :		
8 in.—Main in Pawling avenue, main in Spring avenue.....		895
Ninth street :		
6 in.—Main in House avenue, main in People's avenue .....		5,778
16 in.—Main in People's avenue, main in Federal street.....		405
6 in.—Main in Federal street, southwardly.....		130
North street :		
8 in.—Main in Sixth avenue, main in River street..		500
North Adams street :		
6 in.—East side of Eighth street, main in Tenth street .....		512
Oakwood avenue :		
20 in.—Junction with Tenth street, junction with force main.....		3,777
12 in.—Pump connection .....		32
Orr street :		
6 in.—Main in Ingalls avenue, south line of Douw street .....		509

STREET.	FROM AND TO.	FEET.
Park avenue :		
6 in.—Main in Seventh avenue, main in Cragin avenue.....		429
Pawling avenue :		
16 in.—North end of stone bridge, 48 feet south of Maple avenue.....		4,240
12 in.—48 feet south of Maple avenue, 12 feet south of Myrtle avenue... ..		301
People's avenue :		
16 in.—Main in Ninth street, main in Tenth street...		260
12 in.—“ Tenth street, main in Burdett ave.		2,620
Pine street :		
6 in.—Main in Fifth avenue, main in Read's alley..		170
Pine Woods avenue :		
6 in.—Main in Pawling avenue, 37 feet east of main in Maple avenue.....		2,287
Polk street :		
6 in.—Main in Fourth street, alley west of Second street ..		410
Poplar street :		
6 in.—Main in Pine Woods avenue, southwardly...		24
President street :		
6 in.—Main in Ingalls avenue, 11 feet south of main in Douw street ..		575
4 in.—11 feet south of main in Douw street, main in Douw street.....		11
4 in.—253 feet south of main in Bond street, 182 feet north of same.....		435
Prospect avenue :		
6 in.—Main in Bank street, southwardly.....		300
Read's alley :		
6 in.—Main in Ferry street, main in Pine street....		496



STREET.	FROM AND TO.	FEET.
Rensselaer street :		
8 in.—Main in River street, main in Sixth avenue..		623
River street :		
6 in.—Main in Adams street, main in First street...		3,034
12 in.—“ First street, north city line.....		8,863
12 in.—Orr's mills, main in Middleburgh street.....		400
6 in.—North city line, main in Cemetery avenue...		151
Sausse street :		
6 in.—Main in Oakwood avenue, eastwardly.....		522
Second street :		
12 in.—Main in River street, main in Madison street.		4,847
8 in.—“ Madison street, main in Jackson street ... ..		1,123
6 in.—Main in Jackson street, junction with Burden avenue.....		2,865
Seventh avenue :		
24 in.—Main in Glen avenue, main in Middleburgh street.....		2 227
8 in.—Main in Glen avenue, northwardly.....		278
6 in.—“ Hoosick street, main in Federal street.....		2,275
8 in.—Main in Grand street, main in Ferry street...		2,117
6 in.—“ Ferry street, southwardly .....		228
6 in.—Main in Hill street, Poestenkill.....		223
Seventeenth street :		
6 in.—Main in Hoosick street, main in Hutton street....		944
4 in.—Main in Bank street, northwardly.....		101
6 in.—“ Christie street, main in Highland avenue .. ..		123
Sheldon avenue :		
6 in.—Main in Pawling avenue, westwardly.....		420
Sherman avenue :		
8 in.—Main in Campbell highway, main in Sheridan avenue .....		311

STREET.	FROM AND TO.	FEET.
Sherman avenue:		
6 in.—Main in Sheridan avenue, main in Grant avenue.....		272
Sheridan avenue :		
6 in.—Main in Sherman avenue, main in Thomas street .....		688
Sixth avenue:		
6 in.—Cemetery avenue, main in Middleburgh street .....		2,883
24 in.—Main in Middleburgh street, south of Rensselaer street .....		1,123
8 in.—South of Rensselaer street, main in Hoosick street .....		1,169
4 in.—Main in Hoosick street, 187 feet south of State street.....		3,947
4 in.—187 feet south of south line of State street, two lines 250 feet each, Congress street.....		500
4 in.—Main in Ferry street, northwardly.....		180
4 in.— " Jefferson street, main in Ida street...		400
Sixteenth street :		
6 in.—Main in Christie street northwardly .....		130
6 in.— " Hutton street, northwardly.....		248
Smith avenue :		
6 in.—Main in River street, westwardly, Hudson river.....		820
Snyder avenue :		
6 in.—Main in Erie street, main in Mechanic street.		268
South street :		
8 in.—Main in Eighth street, main in Fifteenth street.....		1,817
Spring avenue :		
6 in.—Main in Hill street, Infirmary road.....		1,083
12 in.— " Campbell highway, main in Maple avenue.....		377
8 in.—Main in Maple avenue, west line of Pawling avenue.....		1,560

STREET.	FROM AND TO.	FEET.
<b>Stannard avenue :</b>		
6 in.—Main in Glen avenue, northwardly.....		298
<b>State street :</b>		
6 in.—Main in River street, 87 feet west of main in Seventh avenue.....		2,131
8 in.—87 feet west of Seventh avenue, main in Seventh avenue .....		87
<b>Stow avenue :</b>		
6 in.—Main in Burden avenue, southwardly.....		316
8 in.—Thence to city line ... ..		174
<b>Stow street :</b>		
6 in.—Main in Burden avenue, westwardly to rail- road .....		216
<b>Summit avenue :</b>		
6 in.—Main in Oakwood avenue, westwardly.....		546
<b>St. John's street :</b>		
6 in.—Main in Fourth street, eastwardly.....		428
<b>St. Joseph's avenue :</b>		
6 in.—Main in Fifth avenue, main in St. Mary's avenue.....		166
<b>St. Joseph's street.</b>		
5 in.—Main in Fourth street, eastwardly.....		316
<b>St. Mary's avenue :</b>		
3 in.—Main in Liberty street, main in Washington street... ..		354
4 in.—Main in Washington street, main in St. Peter's avenue.....		335
<b>St. Peter's avenue :</b>		
4 in.—Main in St. Mary's avenue, main in Haver- mans avenue.....		127
<b>Tenth street :</b>		
6 in.—Main in Oakwood avenue, 192 feet north of main in Middleburgh street.....		1,964

STREET.	FROM AND TO.	FEET.
Tenth street:		
20 in.—Main in Oakwood avenue, main in People's avenue.....		2,466
Terrace Place:		
6 in.—Main in Pawling avenue, westwardly.....		38
Third street:		
12 in.—Main in River street, southwardly.....		50
10 in.—50 feet south of River street, south line of Congress street....		1,363
8 in.—South line of Congress street, south line of Liberty street.....		1,230
4 in.—South line of Liberty street, 8 feet north of Adams street.....		847
6 in.—8 feet north of Adams street, main in Ida street.....		997
20 in.—Main in Ida street, main in Madison street...		664
8 in.—Main in Madison street, main in Van Buren street .....		1,583
Thirteenth street:		
6 in.—Main in Congress street, main in South street .....		1,120
Thomas street:		
8 in.—Main in Campbell highway, main in Sheridan avenue.....		316
6 in.—Main in Sheridan avenue, main in Grant avenue .....		288
Thompson street:		
6 in.—86 feet west of main in Hopkins street, to Eaton street.....		1,574
Tibbits avenue:		
20 in.—Main in Burdett avenue, main in Brunswick avenue.....		640
8 in.—Main in Brunswick avenue, main in Fourteenth street.....		916
Trenton street:		
6 in.—Main in Fourth street, eastwardly... ..		293

STREET.	FROM AND TO	FEET.
Turner street :		
4 in.—	256 feet south of main in Bond street, 92 feet north of same.....	348
Twelfth street :		
6 in.—	Main in Hutton street, 317 feet south of Jacob street.....	1,123
Tyler street :		
8 in.—	Main in First street, main in Fourth street	423
6 in.—	" Fourth street, Hickory street.....	894
Van Buren street :		
6 in.—	Main in Second street, west of First street...	597
8 in.—	" Second street, main in Fourth street	346
4 in.—	" Fourth street, eastwardly.....	27
Vanderheyden street :		
6 in.—	Main in Fifth avenue, west side of Seventh avenue.....	483
Van Every avenue :		
6 in.—	Main in St. Joseph's street, southwardly....	389
Vandenburg avenue :		
8 in.—	Main in Mill street, main in Lark street....	490
6 in.—	" Lark street, south city line.....	340
8 in.—	South city line, junction with Burden avenue	548
Walker avenue :		
6 in.—	Main in Pawling avenue, main in Collins avenue.....	687
Walnut street :		
6 in.—	Main in Marshall street, main in Elm street..	362
Water street :		
8 in.—	Junction with Burden avenue, south and west.....	825
Washington street :		
6 in.—	Center of Front street, main in River street..	176



STREET.	FROM AND TO.	FEET.
Washington street:		
8 in.—Main in River street, main in Fourth street..		1,368
6 in.—“ Fourth street, main in St. Mary's avenue.....		497
4 in.—Main in St. Mary's avenue, main in Havermans avenue.....		166
Washington Place :		
6 in.—Main in Second street, main in Third street..		332
Willis street:		
6 in.—Main in Vandenburg avenue, main in Lark street .....		513
Fire Hydrant Laterals:		
4 in.—Main, fire hydrants.....		13,428

The following is a summary of the sizes and aggregate lengths of pipe :

Twenty-four inch .....	7,132 feet.
Twenty inch.....	33,957 “
Sixteen inch.....	11,497 “
Twelve inch.....	43,215 “
Ten inch .....	4,429 “
Eight inch.....	51,233 “
Six inch.....	113,165 “
Four inch.....	26,744 “
Less than four inch.....	2,976 “
	<hr/>
	294,348 “
Thirty inch force main.....	16,753
	<hr/>
Total.....	311,101 “
Being. ....	58 $\frac{4361}{280}$ miles

## Location of Fire Hydrants.

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### Adams street.

Corner of River.	N. E. corner of Third.
Alley between River and First.	Corner of Church.
N. W. corner of First.	N. E. corner of Fourth.
Alley between First and Second.	Corner of William.
Opp. alley bet. Second and Third.	N. W. corner of Hill.

### Alder avenue

Corner of Maple avenue.

### Alley east of Fourth street.

200 feet south of Monroe.	Corner of Hanover.
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### Alley north of State street.

Opp. alley between Sixth and Seventh avenues.

### Bank street.

278 ft. east of Brunswick avenue.	Corner of Prospect avenue.
Corner of Brunswick avenue.	

### Bleecker avenue.

Corner of Highland avenue.	Corner of Tibbits avenue.
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### Bond street.

Corner of River.	Corner of Turner.
Corner of President.	

## Broadway.

Corner Front.	Corner of William.
Opposite Cannon place.	S. E. corner of Fifth avenue.
Corner of Franklin.	Corner of Union.
Corner of Church.	East of Union depot.

## Brunswick turnpike.

Junction of Congress.	Near city line.
Middle of block.	

## Brunswick avenue.

Corner of Congress.

## Burden avenue.

Corner of Main.	Opposite Mill.
Corner of Center.	South end of bridge.
Corner of Stow.	Opposite rolling mill.
Corner of Kelly.	400 feet east of Stow avenue.
Corner of Cross.	

## Burdett avenue.

Corner of Hoosick.	Corner of Eagle.
Corner of Hutton.	Corner of Jacob.

## Campbell highway.

150 feet west of Spring avenue.	800 feet east of Thomas.
Entrance to County House.	400 feet east of Thomas.
Foot of the Hill.	Opposite Thomas.
Front of Smart's paper mill.	359 feet west of Thomas.
Rear entrance to County House.	Opposite Sherman avenue.
Burden farm house.	

## Canal avenue.

N. W. corner of Third.

## Center street.

200 feet west of Burden avenue.

## Cragin avenue.

S. W, corner of Glen avenue.  
Opposite Park avenue.

East side at south end.

## Chestnut street.

Corner of Elm.

Corner of Marshall.

## Christie street.

Corner of Congress.

## Collins avenue.

Corner of Walker avenue.

## Congress street.

N. E. corner of River.

At No. 217.

Alley between River and First.

Corner of Farm.

N. W. corner of First.

At No. 271.

S. W. corner of Second.

At No. 315.

Corner of Franklin.

N. E. corner of Marshall.

N. W. corner of Fourth.

S. E. corner of Marshall.

N. E. corner of Fifth avenue.

At No. 377.

At No. 139.

Opposite Spring works.

Corner of Sixth avenue.

Opp. old Farnam steamer house.

At No. 172.

At Collins block.

## Cross street.

150 feet north of Kelly.

150 feet south of Kelly.

## Cypress street.

N. E. corner of Congress.

At Wayside mill.

Corner of Elm.

At end of main.

Opp. east road to Peckham's mill.

## Defreest avenue.

Corner of Campbell highway.      Opp. Berger lane.  
Middle of block.

## Division street.

Corner of Front.	Alley bet. Second and Third.
N. E. corner of River	N. E. corner of Third.
Alley between River and First.	Alley bet. Third and Fourth.
N. W. corner of First.	N. W. corner of Fourth.
Alley between First and Second.	

## Douw street.

220 feet west of President.	S. E. corner of River.
Corner of President.	S. W. corner of Sixth avenue.

## Earl street.

Midway bet. Rensselaer and North. Midway bet. Jacob and Hutton.

## Eagle street.

Corner of Thirteenth.

## Eighth street.

At No. 472.	Opp. No. 179.
At No. 448.	S. W. corner of Federal.
At No. 376.	N. W. corner of Federal.
At No. 304.	Corner of Grand.
At No. 299.	Corner of Fulton.
N. E. corner of Hutton.	At N. end Polytechnic Institute.
N. E. corner of Eagle.	At S. end Polytechnic Institute.
Opposite Eagle.	At No. 38.
N. W. corner of Jacob.	Opposite South.
At No. 183.	Corner of Congress.

## Eleventh street.

74 feet south of Jacob.	Corner of Eagle.
N. E. corner of Middleburgh.	S. E. corner of Ingalls avenue.



Elm street, Sixth ward.

Corner of Prince.

Elm Grove avenue.

S. E. corner of Pawling avenue.

Erie street.

At S. Soucy's.  
Opposite Howard.

Corner of Snyder avenue.

Factory road.

362 feet east of Hill.

Farm street.

Corner of Russell.

Federal street.

Opposite Front.  
N. W. corner of River.  
N. E. corner of River.

S. W. corner of Fifth avenue.  
S. W. corner of Sixth avenue.  
Opposite Seventh avenue.

Ferry street.

N. E. corner of Front.  
S. E. corner of Front.  
N. E. corner of River.  
Alley between River and First.  
N. E. corner of First.  
Alley between First and Second  
Alley between Second and Third.  
Alley between Third and Fourth.

Alley between Fourth and Fifth  
avenue.  
Opposite Read's alley.  
Corner of Sixth avenue.  
Corner of Seventh avenue.  
At No. 171.  
At No. 193.  
Junction of Congress.

## Fifth avenue.

175 feet north of Rensselaer.	N. W. corner of Broadway.
S. W. corner of Rensselaer.	Corner of State.
Corner of Jay.	N. W. corner of Congress.
Corner of Vanderheyden,	N. W. corner of Ferry.
N. E. corner of Hoosick.	S. E. corner of Ferry.
Opposite No. 2,336.	At No. 1,457.
S. W. corner of Hutton.	N. W. corner of Liberty.
At No. 2,255.	S. W. corner of Liberty.
Corner of Jacob.	Junction of Hill.
At Christ church.	Corner of alley between Fifth
N. W. corner of Federal.	avenue and Hill.
N. W. corner of Grand.	Corner of Canal avenue.
N. W. corner of Fulton.	

## Fifteenth street.

480 feet north of Hutton.	S. W. corner of Tibbits avenue.
Corner of Eagle.	N. E. corner of Christie.
Corner of Jacob.	S. E. corner of Christie.
Corner of South.	Corner of Marshall.
N. W. corner of Tibbits avenue.	N. E. corner of Congress.

## First street.

N. W. corner of State.	Corner of Madison.
S. W. corner of State.	S. W. corner of Monroe.
S. E. corner of Congress.	N. E. corner of Jackson.
N. W. corner of Ferry.	At No. 397.
N. W. corner of Division.	Corner of Van Buren.
S. E. corner of Liberty.	At No. 436.
N. W. corner of Washington.	Corner of Harrison.
N. E. corner of Adams.	At No. 480.
N. W. corner of Jefferson.	Corner of Tyler.
N. E. corner of Ida.	Opposite No. 519.
Corner of Canal avenue.	Junction of Second.

## Fourteenth street.

Corner of Hutton.	Corner of South.
Corner of Eagle.	Corner of Christie.
Corner of Jacob.	Corner of Marshall
Corner of People's avenue.	

## Fourth street.

S. W. corner of Grand.	At No. 404.
Corner of Fulton.	S. W. corner of Monroe.
Corner of Broadway.	Opposite Hanover.
Corner of State.	Corner of Jackson.
S. E. corner of Congress.	Opposite Trenton.
Corner of Ferry.	Opposite Van Buren.
N. W. corner of Division.	Opposite Lincoln avenue.
Corner of Liberty.	Corner of Harrison.
N. W. corner of Washington.	Corner of Tyler.
N. W. corner of Adams.	Opposite St. Joseph's.
N. E. corner of Jefferson.	Corner of Polk.
Corner of Canal avenue.	Opposite St. John's.
At. No. 370.	Opposite Main.
Corner of Madison.	

## Frear avenue.

227 feet west of Oakwood ave.      445 feet west of Oakwood ave.

## Fulton street.

N. W. corner of River.	N. E. corner of Union.
Corner of Church.	S. E. corner of Union.
Corner of William.	East of Union depot.
S. E. corner of Fifth avenue.	

## Front street.

Opposite Coutie's shop.	Corner of Fulton.
N. E. corner of Grand.	S. E. corner of Broadway.
S. W. corner of Grand.	S. E. corner of Congress.
At Warner's building.	S. W. corner of Congress.

## Glen avenue.

430 feet west of River.	Opposite Cragin avenue.
130 feet west of River.	At Fitchburg R. R.

## Grand street.

N. E. corner of Fourth.  
 Corner of Fifth avenue.  
 Opposite Union.  
 Corner of Sixth avenue.

Alley between Sixth and  
 Seventh avenues.  
 Opposite Seventh avenue.

## Grant avenue.

Corner of Thomas.  
 Middle of block.

Corner of Sherman avenue.

## Hanover street.

Corner of Bedford.

## Harrison Place.

N. E. corner of Federal.  
 Opposite school No. 5.

S. W. corner of Jacob.  
 574 feet north of Jacob.

## Harrison street.

Corner of Second.

## Havermans avenue.

Southerly end.

## Hawthorne avenue.

Corner of Pawling avenue.

742 feet west of Pawling avenue.

## Highland avenue.

Corner of Brunswick avenue.  
 At No. 33.

At No. 3.  
 At city line.

## Hill street.

S. W, corner of Liberty.	Opposite Jefferson.
Corner of Washington.	Corner of Seventh avenue.
South of Union R. R.	At No. 192.
Opposite Adams.	North side at bridge.
At No. 105.	South side at bridge.

## Hoosick street.

S. E. corner of Fifth avenue.	Corner of Sixteenth.
Corner of Earl.	Corner of Seventeenth.
N. W. corner of Sixth avenue.	Corner of Eighteenth.
N. W. corner of Eighth.	Corner of Nineteenth.
N. E. corner of Eighth.	

## Hopkins street.

Corner of Thompson.

## House avenue.

Corner of Tenth.

## Howard street.

Opposite Mechanic.

## Hutton street.

N. E. corner of River.	S. E. corner of Eighth.
Corner of North First.	Corner of Twelfth.
N. E. corner of Fifth avenue.	Corner of Thirteenth.
Corner of Earl.	Corner of Fifteenth.
N. W. corner of Sixth avenue.	Corner of Sixteenth.
	Corner of Seventeenth.

## Ida street.

Corner of alley west of First.	Corner of Fifth avenue.
S. W. corner of First.	Midway between Sixth and
S. E. corner of Second.	Seventh avenues.
Corner of Third.	Corner of Seventh avenue.
Corner of Fourth.	



## Ingalls avenue.

Opposite President.	Corner of Seventh avenue.
N. W. corner of River.	Corner of Orr.
S. W. corner of Sixth avenue.	

## Institute avenue.

273 feet south of Broadway.

## Jackson street.

188 feet west of First.	N. W. corner of Third.
N. W. corner of First.	

## Jacob street.

N. E. corner of River.	Corner of Tenth.
Corner of Earl.	Corner of Eleventh.
Corner of Sixth avenue.	Corner of Twelfth.
S. E. corner of Seventh avenue.	Corner of Thirteenth.
N. E. corner of Eighth.	Corner of Sixteenth.

## Jefferson street.

S. E. corner of First.	Alley bet. Fourth and Fifth ave.
Alley between First and Second.	Corner of Fifth avenue.
N. W. corner of Fourth.	Corner of Sixth avenue.

## Kelly street.

S. E. corner of Cross.

## King street.

At No. 110.	At No. 34.
Corner of Jacob.	

## Lansing avenue.

Midway between Walker and Maple avenues.

## Lark street.

Near city line.

Corner of Willis.

## Liberty street.

S. E. corner of Front.

N. W. corner of Second.

N. E. corner of Front.

Corner of Franklin.

N. E. corner of River.

Corner of Church.

Alley between First and River.

N. E. corner of Hill.

N. W. corner of First.

Corner of St. Mary's avenue.

Alley between First and Second.

## Lincoln avenue.

S. E. corner of Fourth.

175 feet east of Hudson.

N. W. corner of Hudson.

S. W. corner of Francis.

## Linden avenue.

Corner of Pawling avenue.

500 feet west of Pawling ave.

250 feet west of Pawling avenue. At Marshall Infirmary.

## Locust avenue.

Corner of Pawling avenue.

400 feet west of Pawling ave.

Corner of Alder avenue.

## Madison street.

218 feet west of River.

Alley bet. Second and Third.

126 feet west of River.

Alley bet. Third and Fourth.

N. W. corner of River.

Alley between Fourth and Fifth

N. E. corner of River.

avenue.

Alley between First and Second. Corner of Fifth avenue.

## Main street.

Alley between Second and River.

## Mann avenue.

Corner of Fourth.  
Corner of Willow.

Corner of Hudson.

## Maple avenue.

Corner of Spring avenue.  
Corner of Pawling avenue.  
Middle of block.

Corner of Lansing avenue.  
Corner of Collins avenue.

## Mechanic street.

Opposite Hopkins.

## Mill street.

300 feet east of Burden avenue.  
700 feet east of Burden avenue.  
1,000 feet east of Burden avenue.  
N. W. corner of Erie.  
At Woodside church.

100 feet east of Stanton house.  
At Reading Room.  
At bridge.  
Opposite Vandenburg avenue

## Middleburgh street.

N. E. corner of River.  
N. E. corner of Sixth avenue.  
N. W. corner of Seventh avenue.

Opposite Seventh avenue.  
North side, west of railroad.  
S. E. corner of Eighth.

## Monroe street.

307 feet west of River.  
Corner of River.  
Alley between River and First.  
S. E. corner of First.  
S. W. corner of Second.

Corner of Third.  
Alley bet. Third and Fourth.  
S. W. corner of Fourth.  
Alley between Fourth and Fifth  
avenue.

## Mount street.

Corner of Ingalls avenue.  
Corner of Middleburgh.

Corner of North.

## Myrtle avenue.

Corner of Spring avenue.	At No. 23.
Corner of Pawling avenue.	

## Ninth street.

Corner of House avenue.	At No. 281.
At No. 7 Sunnyside.	At No. 253.
At No. 3 Sunnyside.	Corner of Hoosick.
At L. Burton's.	At No. 211.
Corner of Ingalls avenue.	Rear of Samaritan hospital.
N. W. corner of Middleburgh.	Corner of Hutton.
S. W. corner of Middleburgh.	Corner of Eagle.
At No. 371.	Corner of Jacob.
At No. 345.	Opposite People's avenue.
At No. 320.	Corner of Federal.
Corner of North Adams.	130 feet south of Federal.

## North street.

S. E. corner of River.	Opposite Mount.
N. E. corner of River.	

## North Adams street.

S. E. corner of Eighth.

## Oakwood avenue.

Corner of Frear avenue.	Opposite R. Chichester's.
At W. J. Simmons'.	Opposite No. 36.
At E. Lecomte's.	Opposite Sausse.
Corner of Middleburgh.	Corner of Archibald.
At W. Loebles.	

## Orr street.

Corner of Ingalls avenue.	509 feet north of Ingalls avenue.
233 feet north of Ingalls avenue.	

## Park avenue.

N. E. corner of Seventh avenue.      At No. 18.

## Pawling avenue.

East of Memorial church.	At No. 198.
At No. 6 Dale View.	At No. 218.
Junction of Pine Woods avenue.	Opposite Walker avenue.
Opposite J. H. Huntington's.	N. W. corner Maple avenue.
At No. 177.	

## People's avenue.

Corner of Tenth.	Corner of Thirteenth.
Corner of Twelfth.	Corner of Burdett avenue.

## Pine Woods avenue.

Corner of Belle avenue.	Corner of Lake.
Opposite No. 40.	Corner of Poplar.

## President street.

Bet. Ingalls avenue and Douw.

## Polk street.

Corner of alley, bet. Second and River.	Opposite alley east of Second.
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## Prospect avenue.

300 feet south of Bank.

## Read's alley.

Corner of Pine.

## Rensselaer street.

N. E. corner of River.	N. W. corner of Sixth avenue
N. W. corner of North First.	



## River street.

At north city line.	S. E. corner of Jacob.
N. E. corner Glen avenue.	Front of Manufacturers' Bank.
S. W. corner of Glen avenue.	At No. 395.
Opposite Bond.	N. E. corner of Federal.
Opposite Smith avenue.	N. W. corner of Grand.
N. E. corner of Douw.	At No. 338.
At No. 744.	N. W. corner of Fulton.
S. W. corner of Middleburgh.	Corner of Third.
At Mount Vernon Mills.	Alley bet. Second and Third.
At No. 677.	Corner of Second.
At No. 662.	At No. 261.
S. E. corner of Rensselaer.	Corner of Broadway.
At No. 608.	Corner of First.
Corner of Jay.	At No. 234.
At No. 576.	At No. 227.
Corner of Vanderheyden.	Corner of State.
At 546.	At No. 177.
N. W. corner of Hoosick.	N. E. corner of Congress.
N. E. corner of Hoosick.	S. W. corner of Congress.
At No. 508.	At No. 139.
N. E. corner of Hutton.	N. E. corner of Ferry.
S. W. corner of Hutton.	N. W. corner of Division.
At No. 459.	N. W. corner of Liberty.
At Northern hotel.	N. E. corner of Washington.
	At Green's lumber yard.

## Sausse street.

East end.	Middle of block.
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## Second street.

N. E. corner of Broadway.	Corner of Canal avenue.
S. E. corner of Broadway.	At No. 314.
S. E. corner of State.	N. E. corner of Madison.
S. E. corner of Congress.	S. E. corner of Madison.
N. W. corner of Ferry.	At No. 350.
S. E. corner of Ferry.	N. E. corner of Monroe.
N. W. corner of Division.	S. E. corner of Monroe.
S. E. corner of Division.	At No. 388.
S. E. corner of Liberty.	Corner of Jackson.
N. W. corner of Washington.	Corner of Van Buren.

## Second street.

S. E. corner of Washington.	At No. 468.
N. E. corner of Washington place.	Corner of Harrison,
N. E. corner of Adams.	At No. 510.
S. E. corner of Adams.	Corner of Tyler.
Corner of Jefferson.	Corner of Polk.
At railroad crossing.	At No. 563.
N. E. corner of Ida.	

## Seventeenth street.

Between Hoosick and Hutton.      Opposite Christie.

## Seventh avenue.

278 feet north of Glen avenue,	N. E. corner of Jacob.
N. W. corner of Glen avenue.	S. W. corner of Jacob.
S. W. corner of Glen avenue.	At No. 2125.
Opposite Park avenue.	N. W. corner of Federal.
At old gas works.	S. W. corner of Grand.
Corner of Douw.	N. E. corner of Fulton.
Midway in block between Ingalls	S. W. corner of Fulton.
avenue and Douw.	N. E. corner of Broadway.
N. E. corner of Ingalls avenue.	S. W. corner of Broadway.
Corner of Hoosick.	N. W. corner of State.
At No. 2339.	S. W. corner of State.
At No. 2321.	Corner of Congress.
N. E. corner of Hutton.	60 feet south of Congress.
S. W. corner of Hutton.	Corner of Ferry.
N. of railroad crossing.	200 feet south of Ferry.
S. of railroad crossing.	Corner of Hill.

## Sheldon avenue.

400 feet west of Pawling avenue.

## Sheridan avenue.

Midway between Thomas and Sherman ave.

# Sherman avenue.

Opposite Sheridan avenue.

# Sixteenth street.

Corner of Christie.

# Sixth avenue.

At north city line.

At No. 3326.

N. E. corner of Glen avenue.

S. W. corner of Glen avenue.

At No. 3247.

At No. 3151.

S. W. corner of Douw.

Corner of Ingalls avenue.

N. W. corner of Middleburgh.

N. W. corner of North.

Opposite No. 2778.

At No. 2735.

N. W. corner of Rensselaer.

Corner of Jay.

Corner of Vanderheyden.

S. W. corner of Hoosick.

S. W. corner of Hutton.

Opposite No. 2154.

N. W. corner of Federal.

N. W. corner of State.

160 feet north of Ferry.

# Smith avenue.

Corner of River.

Corner of President.

Corner of Turner.

# South street.

At No. 25.

At No. 47.

At No. 73.

# Spring avenue.

Opposite Stoll's brewery.

Corner of Infirmary road.

Opposite Orphan asylum.

300 feet east of Orphan asylum

Corner of Pawling avenue.

# Stannard avenue.

298 feet north of Glen avenue.

## State street.

Alley between First and River.	Alley between Third and Fourth.
Alley between First and Second.	Corner of William.
S. W. corner of Second.	Corner of Union.
Alley between Second and Third.	N. W. corner of Sixth avenue.

## Summit avenue.

S. W. corner of Oakwood avenue. 546 west of Oakwood avenue.

## St John's street.

300 feet east of Fourth.

## St. Joseph's avenue.

Corner of St. Mary's avenue.

## St. Joseph's street, (South Troy.)

Corner of Willow.

## Stow avenue.

Corner of Burden avenue.	Corner of Burke.
At south city line.	

## Stow street.

200 feet west of Burden avenue.

## Tenth street.

Corner of Middleburgh.	At No. 327.
At No. 447.	Corner of Hoosick.
At No. 425.	At No. 285.
At No. 403.	Rear of Hospital of Little Sisters.
Corner of North Adams.	Corner of Hutton.
At No. 351.	Corner of Eagle.

## Terrace place.

N. W. corner of Pawling avenue.

## Third street.

S. W. corner of Fulton.  
 N. W. corner of Broadway.  
 S. W. corner of Broadway.  
 N. E. corner of State.  
 S. W. corner of State.  
 N. W. corner of Congress.  
 S. E. corner of Congress.  
 N. W. corner of Ferry.  
 S. E. corner of Ferry.  
 N. W. corner of Division.  
 Corner of Liberty.

N. W. corner of Washington.  
 N. W. corner of Adams.  
 Opposite No. 255.  
 N. E. corner of Jefferson.  
 S. W. corner of Jefferson.  
 Corner of Madison.  
 Midway bet. Madison & Monroe.  
 Midway bet. Monroe & Jackson.  
 N. E. corner of Jackson.  
 Midway bet. Jackson and Van-  
 Buren.

## Thirteenth street.

Corner of South.  
 Corner of Farm.  
 At No. 48.

Corner of Christie.  
 Corner of Congress.

## Thomas street.

Opposite Sheridan avenue.

## Thompson street.

Opposite Howard.

Corner of Eaton.  
 260 feet west of Eaton.

## Tibbits avenue.

Corner of Fourteenth.  
 Corner of Sixteenth.

Corner of Brunswick avenue.  
 At I. Hayner's.

## Trenton street.

Corner of Fourth.

Opposite Bedford.



## Turner street.

South end of street.

## Twelfth street.

Corner of Hutton.  
 Corner of Eagle.

275 feet south of Jacob.

## Tyler street.

Corner of Willow.  
 Corner of Hickory.

S. E. corner of First.

## Van Buren street.

252 feet west of First.  
 Alley bet. First and Second.

Alley bet. Second and Third.  
 N. W. corner of Third.

## Vandenburgh avenue.

At south city line.  
 Opposite Willis.

Opposite Lark.

## Vanderheyden street.

Corner of Sixth avenue.

Corner of Seventh avenue.

## Van Every avenue.

389 feet south of St. Joseph's.

## Walker avenue.

Corner of Lansing.

## Walnut street.

Corner of Elm.

Corner of Marshall.

## Washington street.

N. E. corner of Front.	Alley between First and Second.
S. E. corner of Front.	N. E. corner of Third.
N. E. corner of River.	N. E. corner of Fourth.
Alley between River and First.	N. E. corner of Fifth avenue.
S. E. corner of First.	Corner of St. Mary's avenue.

## Washington place.

Center of block.

## Water street.

Corner of Burden avenue.	Junction of Lennon.
Corner of Elm.	

## Willis street.

In angle opposite Vandenberg avenue.

Total number of fire hydrants. .... 762

In addition to the above there are two fire hydrants at the pumping station, Lansingburgh.

## Private Fire Hydrants.

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At Burden Iron Co., lower works.....	11
At Burden Iron Co., upper works.....	3
At Clinton Foundry. ....	7
At J. A. Eddy's, Glen Avenue.....	2
At W. H. Frear's, Oakwood avenue.....	1
At Fitchburg R. R., Adams street....	1
At Fitchburg R. R., machine shop .....	1
At Laureate Boat Club Grounds.....	1
At Ludlow Valve Mfg Co.'s Works .....	1
At Marshall Infirmary. ....	2
Marshall estate, at Kellogg's office.....	1
At N. Y. C. & H. R. R. Co.'s machine shop .....	1
At Orr's & Co.'s paper mill.....	1
At Orr's & Co.'s storehouse.....	1
At Oakwood Foundry.....	1
At Rensselaer County House.....	6
At St. Joseph's Home.....	1
At Troy Gas Co.'s works, Smith avenue.....	1
At Troy Steel Co.'s machine shop .....	1
At J. M. Warren's, Eighth street.....	1
At Warren Bro's, Ida Hill .....	1
<hr/>	
Total .....	46

## Annual Water Rates.

The following rates were, upon the recommendation of the Water Commissioners of the City of Troy approved and adopted by the Common Council March 21, and October 29, 1889, and are now in force :

### BUILDING RATES.

For each building having a frontage of twenty-five feet or less, used for dwelling, store, shop, business or manufacturing purposes, upon streets or alleys where mains are laid.....	\$5 00
For each house arranged in the style known as apartments or flats, twenty-five feet frontage or under, per three flats or suits of apartments	10 00
For each additional apartment or flat.....	2 00
For each tenement house in rear having a frontage of twenty-five feet or less, on streets or alleys where no mains are laid, not more than two families.....	3 00
For each additional family.....	1 00
For each foot of building on rear of lot not used for dwelling, store, shop, business or manufacturing purposes.....	05
For each foot of vacant lots on streets where mains are laid.....	02
For each building fronting on two or more streets, where mains are laid, used for other than dwelling purposes the rate shall be fixed by the frontage on the longer side.	
For each additional foot of frontage above twenty five feet on all buildings, front or rear, an increased rate of four per cent.	

The building rate above established for dwelling houses, flats and tenements, entitles the owner to a necessary use of water for domestic purposes. All other buildings must pay in addition to the building rate, for the water actually used in the building according to the rates established for the use of water, or at the regular meter rate.

#### RATES FOR THE USE OF WATER.

For each building used as a dwelling and store combined, in addition to the building rate, from.....	\$1.00 to \$10 00
For each store, shop or saloon, wholesale or retail, in addition to the building rate, from .....	\$1.00 to 10 00
For each building used as a boarding house, in addition to the building rate, from....	\$5.00 to 25 00
For offices and lodging rooms in buildings not used as dwellings, each.....	1 00
For each bath-tub in dwelling.....	2 00
For each water-closet in dwelling.....	3 00
For each urinal in dwelling.....	2 00
For each bath-tub, water-closet or urinal in shops, saloons, tenements, office and manufacturing buildings, or where large numbers may and do have access to the same, double the above rates.	
For bakeries, per barrel of flour, or less, used daily.....	2 00
For banks and banking houses, from....	\$2.00 to 5 00
For barber shops, per chair.....	2 00
For bookbinderies, from.....	\$2.00 to 5 00



For cows, each.....	\$1 00
For hydraulic compressors in saloons.....	5 00
For fountains, $\frac{1}{16}$ to $\frac{1}{4}$ inch jet, per season, from.....	\$15.00 to 50 00
For foundries, per moulding floor.....	60
For Horses—private stables—	
For each team or horse used for pleasure driv- ing.....	5 00
For each additional horse.....	2 00
For Work Horses--	
For each team or single horse.....	2 00
For each additional horse.....	1 00
For markets, from.....	\$2.00 to 6 00
For photographic establishments, from.....	\$10.00 to 25 00
For printing establishments, from.....	\$5.00 to 15 00
For public halls, from.....	\$5.00 to 20 00
For soda fountains, from.....	\$3.00 to 10 00
Additional for tumbler washer.....	3 00
For steam engines, per horse-power.....	2 50
For stand-pipes in buildings, to which hose is or may be attached, or for automatic sprink- lers put in and used for fire purposes only, NO CHARGE.	
Said stand-pipes to be put in under the direction of the Superintendent who may examine all such fixtures, and if found defective may withhold the supply of water until the work is satisfactory to him. In no case will any stand-pipe or pipe supplying automatic sprink- lers be allowed to be tapped or have any con- nection for the delivery of water for any other purpose.	
For theatres, from.....	\$5.00 to 25 00

FOR OTHER USES NOT HEREIN ENUMERATED,  
METER RATES AS FOLLOWS :

For each one thousand gallons used for all purposes..... 5 cents.

Water takers paying for their supply by meter measure shall be entitled to a rebate on their water bills equal to the amount of the building rate assessed in the tax books on the premises where the water is used.

Meters to be taken monthly, bills to be rendered and paid quarterly.

Whenever this Department has reason to believe that any consumer is using more than the amount set opposite the taxed rate, or the consumer is dissatisfied with the taxed rate, he may make application for the measurement of the supply, and the Superintendent shall, at the direction of the Board of Water Commissioners, place a meter upon the supply pipe for the purpose of measuring the water actually consumed. Such meter will be furnished by the city and set at the expense of the owner. In case the quantity as determined by meter is more than allowed by the rate, the owner will be charged for such additional quantity at the meter rate, from the date of the application of the meter, and in case the quantity as determined by the meter is less than allowed by the rate, the city will refund such difference at the meter rate, from the date of the application of the meter to the end of the year, for which such rate was fixed. In no case, however, will the application for a meter be granted when the annual rate is less than \$20.

## SPECIAL RATES—PAYABLE IN ADVANCE.

Sprinkling with small hose, sidewalks and roadway, washing stoops, windows and fronts, for each twenty-five feet of frontage, not to exceed one hour a day, with nozzle not larger than $\frac{1}{4}$ inch.....	\$3 00
For each additional lineal foot of street sprinkled, as above.....	10
Sprinkling with small hose grounds and lawns, for each 100 square feet sprinkled, not exceeding one hour per day, with nozzle not larger than $\frac{1}{4}$ inch.....	40
Sprinkling grounds and lawns with revolving sprinkler, for each 100 square feet sprinkled..	80
For filling cisterns, flushing vaults or sewers with hose from fire hydrant, including use of man for first hour or fraction thereof.....	2 00
For each succeeding hour or fraction thereof...	1 00
For all watering troughs, which must be fitted up with float valve purchased of the Department, under the direction of the Superintendent for the season of eight months.....	5 00
Brick, per thousand.....	07
Stone work, per hundred cubic feet.....	06
Plastering, per hundred square yards.....	30
Sewing machines, used as a means of livelihood, per year, payable monthly.....	12 00

# Inventory.

## PIPES, SPECIALS AND VALVES.

Size.	Pipe.	4-Ways.	3-Ways.	Reducers.	Bends.			Sleeves.	Caps.	Offsets.	Plugs.	Valves.	Y's.	Pieces.
					1/4	1/8	1-16							
<b>30</b>	7	..	..	..	..	..	4	4	..	..	..	..	..	..
<b>24</b>	5	..	..	..	..	..	2	6	..	..	..	..	..	1
x6	..	..	1	..	..	..	..	..	..	..	..	..	..	..
x4	..	..	5	..	..	..	..	..	..	..	..	..	..	..
<b>20</b>	43	..	..	..	..	..	..	7	1	..	..	..	..	5
x20	..	1	1	..	..	..	..	..	..	..	..	..	..	..
x16	..	1	..	..	..	..	..	..	..	..	..	..	..	..
x12	..	..	4	..	..	..	..	..	..	..	..	..	..	..
x10	..	1	..	..	..	..	..	..	..	..	..	..	..	..
x8	..	2	..	..	..	..	..	..	..	..	..	..	..	..
x6	..	2	1	..	..	..	..	..	..	..	..	..	..	..
x4	..	..	5	..	..	..	..	..	..	..	..	..	..	..
<b>16</b>	3	..	..	..	..	2	..	5	3	..	..	..	..	1
x16	..	..	..	..	..	..	..	..	..	..	..	..	..	..
x12	..	..	1	..	..	..	..	..	..	..	..	..	..	..
x10	..	..	..	..	..	..	..	..	..	..	..	..	..	..
x8	..	2	3	1	..	..	..	..	..	..	..	..	..	..
x6	..	3	1	..	..	..	..	..	..	..	..	..	..	..
x4	..	..	10	..	..	..	..	..	..	..	..	..	..	..
<b>12</b>	14	..	..	..	2	12	..	7	8	..	..	..	..	12
x12	..	1	1	..	..	..	..	..	..	..	..	..	..	..
x10	..	1	..	1	..	..	..	..	..	..	..	..	..	..
x8	..	5	5	7	..	..	..	..	..	..	..	..	..	..
x6	..	6	..	2	..	..	..	..	..	..	..	..	..	..
x4	..	..	3	..	..	..	..	..	..	..	..	..	..	..
<b>10</b>	16	..	..	..	..	..	..	5	2	..	..	..	..	2
x10	..	1	1	..	..	..	..	..	..	..	..	..	..	..
x8	..	1	..	1	..	..	..	..	..	..	2	2	..	..
x6	..	..	4	1	..	..	..	..	..	..	..	..	..	..
x4	..	3	9	..	..	..	..	..	..	..	..	..	..	..
<b>8</b>	8	..	..	..	4	13	9	1	..	..	1	..	..	34
x8	..	25	4	..	..	..	..	..	..	..	..	..	..	..
x6	..	9	11	5	..	..	..	..	..	..	..	..	..	..
x4	..	15	13	8	..	..	..	..	..	..	..	..	..	..
<b>6</b>	33	..	..	..	7	7	11	7	9	8	11	..	4	6
x6	..	16	5	..	..	..	..	..	..	..	..	..	..	..
x4	..	7	30	8	..	..	..	..	..	..	..	..	..	..
<b>4</b>	22	..	..	..	15	17	..	35	15	19	..	..	..	16
x4	..	8	13	..	..	..	..	..	..	..	..	..	..	..
<b>3</b>	2	..	..	..	..	..	..	..	..	..	..	1	..	..

1 20-in. 1/4 bend, 8-in. take-off; 1 16-in. 1/4 bend, 6-in. take-off;

1 20x20x20x6 4-way.

## LEAD PIPE.

2-inch AA.....	8 coils.
1½-inch AA.....	9 "
1½-inch AA.....	13 "
1-inch AA.....	15 "
¾-inch AA.....	47 "
½-inch AA.....	1 "
<hr/>	
Total.....	93 "

## SUPPLIES.

Lead.....	lbs. 5,780	2-inch brass bolts.....	75
Solder.....	" 269	stop box screws.....	200
Tarred yarn.....	" 7	stop box bottoms.....	54
Rubber packing.....	" 5½	" " tops.....	53
Nails.....	" 42	" " extensions.....	51
Block tin.....	" 1½	" " covers.....	85
Yard hydrants, complete..	24	Fire hydrant top bolts.....	50
" " valves.....	14	Ludlow hydrant washers...	3
" " tubes.....	53	Eddy " ".....	5
" " elbows.....	57	Wood. cords.....	¾
" " spouts..	80	Charcoal, bush.....	64
" " cranks.....	71	Coke, tons.....	15
" " caps.....	63	¼ bbl rosin.....	
" " rods.....	57	1 broom.....	
" " posts.....	3	Waterford fire valves.....	6
" " tail pieces.	8	Bailey fire hydrant.....	1
Wash hydrants.....	4	Ludlow fire hydrant.....	1

## BRASS GOODS.

Taps, 2-in.....	13	Cocks, 2-inch.....	12
" 1½-inch.....	2	" 1½-inch.....	7
" 1¼-inch.....	32	" 1¼-inch.....	13
" 1-inch.....	56	" 1-inch.....	32
" ¾-inch.....	94	" ¾-inch.....	103
4 ⅝ thimbles.....		1½-inch valve.....	1
3 1-inch thimbles.....		8-inch valve covers.....	4
1 3-inch valve stem, Eddy..		6-inch ".....	8
2 8-inch valve stems, Eddy.		4-inch ".....	4
1 6-inch valve stem, Eddy..		Valve boxes, complete.....	2
3 6-inch valve stems, Ludlow		Valve box covers.....	24
4 4-inch valve stems Ludlow		" " tops.....	6
2 6-inch value stems, Brown		" " extensions...	6
1 12-inch valve, Ludlow.			



## METERS.

2-inch Gem .....	1	1-inch Terry.....	1
3/4-inch Crown.....	5	3/4-inch Trident.....	1

## PIPE TOOLS AND EQUIPMENTS.

2 tripod derricks,	2 melting furnaces,
2 2-ton chain blocks,	3 large lead kettles,
1 1/2-ton chain block,	1 small lead kettle,
2 1-ton chain blocks,	5 pouring kettles,
1 "tripple set" blocks,	3 ladle shanks,
4 single set blocks,	5 pouring chains,
2 3-inch pulsometers,	3 ladles,
2 No. 3 diaphragm pumps,	4 sets calking tools,
2 No. 3 diaphragm pump rubbers,	5 calking hammers,
1 2 1/2-inch syphon pump,	3 yarning irons,
4 lengths 4-inch rubber suction,	11 cold chisels,
3 3-inch bilge pumps,	4 dog chisels,
6 lengths cotton hose,	17 diamond points
1 fire hydrant reducer,	1 24-inch pipe jointer,
4 wooden pails,	1 20-inch pipe jointer,
1 blasting dynamo and wire,	1 16-inch pipe jointer,
1 lot blasting timber,	2 12-inch pipe jointer,
3 sledge hammers,	1 10-inch pipe jointer,
5 striking hammers,	2 8-inch pipe jointers,
5 steel bars,	1 6-inch pipe jointer,
15 rammers,	2 4-inch pipe jointers,
7 hammers drills,	2 pipe ropes.
1 4-foot bracing saw,	
27 pieces chain,	
13 sledge hammer handles,	

## SHOP TOOLS AND EQUIPMENTS.

1 8-inch lathe,	3 fire hydrant keys,
1 open lathe,	1 steam pump,
3 bench vises,	2 yard hydrant keys,
2 pipe vises,	3 pairs hip boots,
1 platform scale,	3 pairs short boots,
2 boilers for thawing,	3 pairs 2-inch pipe tongs,
2 force pumps,	1 pair 1 1/4-inch pipe tongs,
2 hand pumps,	1 pair 1-inch pipe tongs,
40 pounds tin tubing,	2 pairs 3/4-inch pipe tongs,
2 pressure gauges,	1 20-inch monkey wrench,
3 tapping machines,	3 12-inch monkey wrenches.

4 extra gaskets for same,	3 small monkey wrenches,
1 ratchet drill,	1 plumbers' ladle,
1 breast drill,	1 set small calking tools,
1 Tasker stock and die,	9 torches,
1 ratchet stock and die.	3 copper bolts,
1 2-inch pipe cutter,	2 chisels,
2 chain tongs.	3 bit braces,
3 hand saws,	2 axes,
1 draw knife,	3 picks.
1 plane,	13 shovels,
1 claw hammer,	1 scoop,
1 level,	2 rakes,
1 square	2 paving rammers,
9 augers,	3 pa'ing hammers,
1 trowel,	8 pounders,
2 hoes,	1 step ladder,
2 iron jackscrews,	1 anvil,
14 globe lanterns,	1 forge,
1 100-foot tape,	1 lot of tongs,
1 clock,	6 wheelbarrows,
2 coal hods,	27 wooden horses,
5 fire hydrant wrenches,	22 2-inch planks "long,"
6 street keys,	10 2-inch planks "short."
5 sidewalk keys,	2 plumbers' melting kettles.
2 charcoal furnaces,	

## BARN.

3 horses,	1 set runners,
6 blankets,	1 bob sleigh,
3 sets of single harness,	1 set Mason's bobs,
1 set double harness,	2 pails,
3 truck wagons,	brooms, brushes, scoops,
1 open wagon,	shovels, etc.
	5 cakes harness soap.

## RESERVOIR.

1 double wagon.

## PUMPING STATION, No. 2.

1 pump and fittings,	1 pean hammer,
1 boiler,	1 quart oil can,
2 7-inch suction pipes,	3 2-gallon kerosene oil cans
2 scoop shovels,	1 small oil can,

- |                          |                |
|--------------------------|----------------|
| 1 fire rake,             | 1 broom,       |
| 1 slice bar,             | 4 white lamps, |
| 1 12-inch monkey wrench, |                |
| 1 6-inch monkey wrench.  |                |

# INSTRUMENTS, TOOLS, ETC., USED BY ENGINEERING CORPS. (NEW SUPPLY.)

- |  |   |
|--|---|
| 1 transit instrument, tripod<br>box, etc., | 1 spade,  |
| 5 stadia rods,                             | 1 shovel,                                       |
| 4 flag poles,                              | 1 5-gal. kerosene oil can,                      |
| 1 50-foot metallic tape,                   | 1 chain, $\frac{3}{8}$ long,                    |
| 1 set surveying pins,                      | 1 chain sling, 12.5 feet long,                  |
| 2 brass plumb bobs,                        | 1 hose with suction for pumps<br>32½ feet long. |
| 1 cast iron plumb bob,                     | 1 force pump,                                   |
| 1 hatchet,                                 | 105 ft. $1\frac{1}{3}$ in. rope,                |
| 1 axe,                                     | 94½ ft. $1\frac{1}{8}$ in. rope,                |
| 4 drafting boards,                         | 86½ ft. 1-in. rope.                             |
| 1 drafting table,                          | 208 ft. 1-in. rope,                             |
| 2 double blocks,                           | 30 ft. 1-in. rope,                              |
| 1 tool box and lock,                       | rope slings.                                    |
| 1 saw.                                     |   |

## Pumping Station.

### MAIN BUILDING.

2 sets Holly pumping engines,	1 test pump and gauge
1 heater and filter,	6 rubber mats,
2 donkey pumps,	1 hose carriage,
5 steam radiators,	1 hose pipe,
1 clock,	300 ft. 2½ inch linen hose,
2 tables,	100 ft. ¾-inch rubber hose,
4 chairs,	1 pipe fitters' bench,
2 spittoons,	2 pipe fitters' die plates,
3 slates,	2 pipe vises,
1 log book in use,	1 set pipe dies,
13 log books, old,	1 set pipe taps,
1 requisition book,	1 set pipe tongs,
1 coal weight book,	3 pipe cutters,
2 brass oil filters,	15 lengths of pipe,
3 steel oil cans,	40 pipe fittings,
1 patent oil can,	2 jack screws,
1 brass oil tray,	5 crow bars,
8 copper drip pans,	1 hand saw,
1 copper hammer,	2 planes,
1 bronze sledge,	1 extension bit,
2 gland wrenches,	1 bit brace,
16 open wrenches,	2 barometers,
4 box wrenches,	1 thermometer,
8 socket wrenches,	2 screw drivers,
1 work bench,	1 ratchet,
1 bench vise,	1 hand drill press,
1 steam damper regulator,	1 set of drills,
1 engine card indicator,	1 chuck for drills,
2 hand die plates,	3 steel sledges,
1 set machine taps,	100 feet of packing,
2 pairs oars,	3 exhaust seats for st'm cylinder
1 grind stone,	600 rubber valves, new,
3 engine regulators,	900 rubber valves, old,
1 bolt extractor,	8 valve cages, brass,
14 eye bolts,	8 valve seat cages, brass,

100 bolts,	1 20-in x 14-in x 14 in. tee,
1 hand shears,	4 steam valves and seats for
20 chisels,	steam cylinder,
3 lanterns,	2 pieces 14-in. suction pipe,
1 axe,	3 5-inch copper pipes,
1 hand bellows,	2 5-inch valves from old boilers,
6 brooms.	2 6-in. valves,
10 packing hooks,	1 window brush,
1 8-in. flange pattern,	5 step ladders,
1 wooden horse,	25 gallons lard oil,
1 manhole plate pattern,	80 gallons cylinder oil.
1 handhole plate pattern,	500 lbs. bearing grease,
8 slings,	1 water cooler,
2 chain tackles,	25 plate gaskets,
	1 pair blocks and tackle.

#### BOILER ROOM.

4 6 ft. 6-in. x 18 ft. boilers,	1 10 ft. ladder,
1 auxiliary boiler,	2 brooms,
3 shovels,	1 coal hammer,
2 iron wheelbarrows,	7 fire hoes,
1 portable forge,	3 slice bars,
1 anvil,	4 lazy bars,
1 clock,	1 clinker rake,
1 wardrobe,	3 hand lamps,
1 slate,	1 wash sink,
25 feet $\frac{3}{4}$ in. rubber hose,	1 3-in. flue brush,
1 water pail,	1 tube steam blower,
1 gallon can,	2 wooden horses.
1 15 ft. ladder,	

#### COAL ROOM.

1 Fairbanks scale,	1 coal car transmitter,
2 coal buckets,	

#### COAL HOISTING, ENGINE ROOM.

1 hoisting engine,	1 hoisting steel cable.
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#### STORE ROOM WEST OF MAIN BUILDING.

1 lawn mower,	$\frac{1}{4}$ bbl. cement,
2 garden rakes,	1 scythe,
1 stable broom,	1 spade,
1 pick,	2 steel shovels,

1 saw,	1 pair blocks and tackle,
6 slings,	1 bbl. fire clay,
460 fire brick,	1½ bbls. fire sand,
10 gals. kerosene oil,	25 lbs. of waste,
30 gals. boiled oil.	1 mason's hoe.

## ON GROUNDS OUTSIDE.

1 24-in. sleeve,	1 24-in. length cast-iron pipe.
1 24x30-in. Y,	1 lawn roller,
4 wooden horses,	14 spruce planks,
2 boats,	6 tile pipes,
1,778 $\frac{1148}{3240}$ tons Buckwheat coal,	1 windlass, 1 30-ft ladder, 1-20
2 sectional bents for hoisting	ft. ladder,
heater,	2 sectional bents for hoisting
	engine main shaft and fly
	wheels.

Respectfully submitted,

SAMUEL O. GLEASON,  
DENNIS J. WHELAN,  
RICHARD F. HALL,  
JAMES FLEMING,  
HARRY M. ALDEN,

*Water  
Commissioners,*

WATER COMMISSIONERS' OFFICE,

*Troy, N. Y., March, 1898*



REPORT OF  
EDWARD DOLAN,  
SUPERINTENDENT,  
TROY WATER WORKS.

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*Board of Water Commissioners:*

GENTLEMEN—The following report of the operation and condition of this Department for the year ended February 28, 1898, is presented ;

SUPPLY.

The rain-fall for the calendar year, 1897, as appears in the rain-fall tables printed elsewhere in this report, was 40.79 inches. For the Water Works year—the period embraced in this report—viz: from March 1, 1897, to March 1, 1898, the rain-fall was 43.65 inches, as against 26.54 inches for the corresponding time in the previous year. This is an increase of a little over 64 per cent. and 19 per cent. above the annual average for the past 72 years. In the months of March, September and October the rain-fall was below the averages for those months, but in each of the remaining nine months there was a large excess. This excess occurring in five successive months, beginning with April, and again in four successive months, commencing with November, gave to the earth a redundancy of moisture and restored to a

normal condition the springs and streams, which in consequence of the drouth of the two preceding years had lacked their accustomed fulness. At the beginning of the year, Brunswick and Vanderheyden lakes were about one-quarter full. They steadily continued to gain in volume up to June 18, when Brunswick lacked 4 inches, and Vanderheyden 3 feet 6 inches of being full. During the balance of the season they remained in a very satisfactory condition, the drafts of the extreme warm months being met by frequent and abundant rains. The lowest points reached by them was observed on November 12th, when Brunswick was 3 feet 8 inches, and Vanderheyden 7 feet 6 inches below their respective flow lines. On December 18, they were both full and for 12 days furnished the entire supply for the city, allowing both pumps to be shut down.

Since then, up to the present time, besides supplying the High and Middle services, they have contributed 2,000,000 gallons daily to the maintenance of the Low service, and it has been necessary to run only one pump.

At present they are still full, with the prospect of so remaining for at least a month. It is estimated that 63 per cent. of the entire rain-fall on the Piscawenkill water shed was available during the year. The run-off for the last three months, viz., December, January and February was 97 per cent. of the precipitation. The frozen state of the ground greatly contributed to this result. All the above mentioned favorable conditions concurring to an unusual degree, the gravity supply yielded almost an unprecedented amount, and excepting the months of April and August, aided in maintaining the Low service. By daily and careful supervision it was all utilized, and none suffered to waste.

The total amount of water provided for all the services was 3,660,538,723 gallons, of which the Piscawenkill furnished 841,785,000 gallons, and the pumps in Lansingburgh 2,818,753,723 gallons. The pumps were run together 142 days, and singly 206 days; 17 days they

were idle. The average daily use of water on all the services was 10,028,873 gallons, an increase of 380,959 gallons over the previous year.

#### RESERVOIRS.

The following table shows the capacity in gallons of Brunswick and Vanderheyden lakes; also of Oakwood and Middle service reservoirs when full, and at each foot below their respective flow lines down to 16 feet:

Gauge Reading.	Brunswick Lake.	Vanderheyden Lake.	Oakwood Reservoir.	Middle Service Reservoir.
Full.....	152,684,000	58,319,000	34,530,000	35,180,000
1.....	140,724,000	53,013,000	32,130,000	32,450,000
2.....	129,120,000	47,919,000	29,780,000	29,840,000
3.....	117,848,000	43,010,000	27,560,000	27,130,000
4.....	106,848,000	38,276,000	25,390,000	24,620,000
5.....	96,110,000	33,689,000	23,230,000	22,160,000
6.....	85,643,000	29,210,000	21,150,000	19,790,000
7.....	75,578,000	24,977,000	19,110,000	17,460,000
8.....	65,933,000	21,002,000	17,400,000	15,243,000
9.....	56,795,000	17,271,000	15,000,000	13,040,000
10.....	48,305,000	13,786,000	13,580,000	10,950,000
11.....	40,260,000	10,539,000	11,970,000	8,880,000
12.....	32,527,000	7,527,000	10,520,000	6,910,000
13.....	25,005,000	4,828,000	9,100,000	4,980,000
14.....	17,793,000	2,515,000	7,830,000	3,150,000
15.....	11,175,000	1,097,000	6,640,000	1,360,000
16.....	5,267,000	463,000	5,540,000	000,000

The work done at the reservoirs and buildings this year was as follows:

Care of reservoir grounds, consisting of cutting grass, removing eel grass and weeding along borders of reservoirs. Cost.....	\$468 00
Shingling Vanderheyden well house, material and labor. Cost.....	34 58
Building shed at old reservoir house, material and labor. Cost.....	95 77
Painting Vanderheyden well-house, material and labor. Cost.....	48 75
Improving grounds and building roads between Middle and High services. Labor cost.....	60 75

Laying new floor in Brunswick well-house, material and labor. Cost.....	5 89
Building overflow at Middle service reservoir, material and labor. Cost.....	40 20
Putting in hot water boiler at reservoir farm house, material and labor. Cost.....	16 28
Cleaning creek from Vanderheyden to High service reservoir. Labor cost.....	45 00
Cleaning High service reservoir. Labor cost.....	102 00
Putting in glass at reservoir house, material and labor. Cost.....	8 46
Putting tin roof on pump house, Oakwood avenue. Contract price.....	57 00
Rebuilding powder house, material and labor. Cost....	37 09
Repairing bridge at Low service reservoir, material and labor. Cost.....	10 90

## DISTRIBUTION.

There were laid 3521 feet of distributing pipe this year in the various services as follows:

Low service.....	651 feet.
Middle service.....	— “
High service.....	2,870 “
Fire hydrants laterals.....	82 “

The entire pipage of all the services is as follows:

Service.	DIAMETER IN INCHES.									Hydrants.
	24	20	16	12	10	8	6	4	Less than 4	
Low.	7,132	14,568	4,283	23,179	4,429	34,241	74,667	12,663	2,976	536
Middle.	.....	7,796	2,974	4,984	.....	4,218	10,634	552	.....	74
High.	.....	11,593	4,240	15,052	.....	12,774	28,464	101	.....	152
Fire hydrant laterals.	.....	.....	.....	.....	.....	.....	.....	13,428	.....	.....
Totals.	7,132	33,957	11,497	43,215	4,429	51,233	113,165	26,744	2,976	762

	Miles.	Feet.
Low Service.....	33	3,298
Middle service.....	5	4,758
High Service .....	13	3,584
Fire Hydrant Laterals.....	2	2,868
Force Main.....	3	913
Total.....	58	14,861

58  $\frac{4861}{2880}$  miles.

## CONSTRUCTION.

The construction this year consisted in:

Extending main in Earl street from main in Hoosick street, northwardly 198 feet 6-inch pipe, 1 6-inch cap, 1 6-inch 1-16 bend, 1 6-inch valve and box, 174 lbs. lead, 4 bush. coke, 3 lbs. yarn, cartage \$2.50, 48 days labor. Cost.....	\$159 07
Laying mains in Belle avenue from main in Pinewoods avenue, northwardly 30 feet 6-inch pipe, 1 6x6 tee, 1 6-inch sleeve, 1 6-inch cap, 81 lbs. lead, 1 bush. coke, 2 lbs. yarn, cartage \$1.50, 7.7 days labor, reconnecting 2-inch lateral. Cost. ....	33 49
Laying main in Lake street from main in Pinewoods avenue, northwardly and southwardly 57 feet 6-inch pipe, 2 6-inch caps, 1 6-inch offset, 68 lbs. lead, 2 lbs. yarn, 2 bush. coke, cartage \$1.50, 6.5 days labor. Cost.....	34 14
Laying main in Larch street from main in Pinewoods avenue, southwardly 27 feet 6-inch pipe, 1 6x6 tee, 1 6-inch cap, 1 6-inch sleeve, 67 lbs. lead, 1 lb. yarn, 2 bush. coke, cartage \$1.50, 4.7 days labor. Cost....	23 82
Laying main in Poplar street from main in Pinewoods avenue southwardly, 24 feet 6-inch pipe, 1 6x6 tee, 1 6-inch $\frac{1}{4}$ bend, 1 6-inch sleeve, 1 6-inch cap, 94 lbs. lead, 1 lb. yarn, 2 bushels coke, cartage \$1.50, 4.2 day's labor. Cost.....	25 48
The line of Polar street was changed and this connection was used for a fire hydrant at a cost of....	28 34
Extending main in Pinewoods avenue to a point 37 feet east of Maple avenue, 37 feet, 6-inch pipe, 1 6x6 tee, 1 6-inch cap, 72 lbs. lead, 3 lbs yarn, 2 bushels coke, cartage \$1.50, 7.5 days labor. Cost.....	30.32
Extending main in Thompson street from main in Howard street eastwardly, 1,138 feet 6-inch pipe, 36-feet 4-inch pipe, 3 6x4 tees, 1 6x6 cross, 1 6x6 tee, 3 6-inch plugs, 1 6-inch cap, 1 8x6 reducer, 1 4-inch cap, 2 fire hydrants, 1 6-inch valve, 1 box, 1,065 lbs. lead, 10 lbs. yarn, 6 bushels coke, cartage \$34.85, 117.1 days labor. Cost.....	667 33
Extending main in Hawthorne street from a point 34 feet west of the Pawling avenue main westwardly, 742 feet 6-inch pipe, 21 feet 4-inch pipe, 3 6x4 tees, 1 6-inch cap, 1 4-inch cap, 2 fire hydrants, 749 lbs. lead, 13 lbs, yarn, 4 bushels coke, cartage \$9.04, 59.8 days labor. Cost.....	401 11

Laying main in Fifteenth street from main in Hoosick street southwardly, 815 feet 12-inch pipe, 25 feet 4-inch pipe, 2 12x4 tees, 1 12x12 cross, 1 12-inch cap, 1 12x6 reducer, 1 12-inch sleeve, 1 12-inch valve, 2 4-inch valves, 3 boxes, 1 fire hydrant, cartage \$25.08, blacksmithing \$1.75, 1,635 lbs lead, 10 bushels coke, 35 lbs. yarn, 155.6 days labor, reconnecting $\frac{3}{4}$ inch lateral, 77 lbs. $\frac{3}{4}$ lead, 2 joints, 2.5 days labor. Cost	1,003 08
Extending blow-off in Laureate avenue, 36 feet 6-inch pipe, 30 lbs. lead, 1 lb. yarn, 1 bush. coke, cartage 75c, 10.2 labor. Cost.....	27 61
Laying main in Stannard avenue from main in Glen avenue northwardly, 298 feet 6-inch pipe, 1 24x6 tee, 1 24-inch sleeve, 1 6x4 reducer, 1 fire hydrant, 1 6-inch valve, 1 box, 245 lbs. lead, 4 bushels coke, 13 lbs. yarn, cartage \$4.50, 78.6 days labor, Cost....	300 58
Laying main in Union street from main in Congress northwardly, 119 feet, 4-inch pipe, 1 6x4 reducer, 1 4-inch cap, 1 4-inch valve, 1 box, 70 lbs. lead, 2 bushels coke, 3 lbs. yarn, cartage \$1.50, 35.1 days labor. Cost.....	93 12
Placing valve on fire hydrant at Hoosick and Nineteenth streets. 1 4-inch valve, 1 box, 9 lbs. lead, 1 lb. yarn, 1 bush. charcoal, 1.5 days labor. Cost.....	17 25
There have been added to the distribution this year 8 valves—5 on street mains, 3 on fire hydrant laterals and 7 fire hydrants.	

## RAISING MAINS.

In Campbell Highway, 12-inch main over new bridge, 69.5 days labor. Cost .....	\$104 25
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## LOWERING MAINS.

In Campbell Highway, exploders \$9.00, cartridges \$3.50, tool dressing \$12.10, incidentals \$3.50, cartage \$11.00, labor \$548.95. Cost.....	\$588 05
In St. John's street, 109.2 days labor. Cost.....	163 80

## RAISING FIRE HYDRANTS.

Hoosick and Nineteenth streets, 2 4-inch $\frac{1}{4}$ bends, 9 lbs. lead, 2 lbs. yarn, 1 bush. charcoal, 1.5 days labor. Cost .....	\$5 77
Burdett avenue and Hoosick street, 2 days labor Cost.	3 00



Pine Woods and Belle avenues, 2 days labor. Cost....	3 00
Eighth street, between North Adams and Hoosick streets, 2 days labor. Cost .....	3 00
Ninth and North Adams streets, 2 days labor. Cost...	3 00
Ninth street, at No. 345, 2 days labor. Cost.....	3 00
Ninth street, at No. 371, 2 days labor. Cost.....	3 00

## LEAKS.

During the year there were 20 leaks on mains distributed as follows:

11 on Force Main, costing in labor, etc.....	\$204 31
6 on Distribution Main, " .....	115 88
3 on Fire Hydrant Laterals, " .....	17 34

There were 14 leaks on main and fire hydrant valves, labor, etc.  
Cost..... \$36 20

There were 654 leaks reported by the inspectors, divided as follows: 128 in laterals, 230 in water closets, 112 in faucets, 140 in yard hydrants, 44 in wash hydrants.

## INSPECTION AND REPAIR OF FIRE HYDRANTS.

Putting in 2 new stand pipes.....	\$48 40
Thawing out 88 hydrants.....	189 30

## METERS.

There are now 278 meters in use, having applied this year 15 and removed 4. The following table shows the location and application as to use of meters :

Asylums .....	5
Baths .....	1
Banks .....	1
Bakery.....	1
Bottling Works.....	7
Breweries .....	11
Brick yards.....	3
Church organs.....	23
Club house.....	1
Coffee mill.....	1

Dwellings.....	6
Dye houses.....	3
Elevators.....	33
Fan motors.....	19
Foundry.....	1
Institutions, charitable ...	8
"    educational.....	6
"    of correction.....	4
Hospitals.....	4
Hotels.....	16
House organs.....	6
Laundries.....	16
Libraries.....	3
Livery stables.....	19
Markets.....	2
Malt houses.....	4
Manufactories ..	49
Offices ..	3
Public buildings ..	5
Railroads ....	8
Stores.....	9

15 meters have been removed temporarily on account of cold weather, which are to be replaced.

The following table shows the size and make of all the meters in use :

		6 in.	4 in.	3 in.	2 in.	1½ in.	1 in.	¾ in.	Tot'l
Crown ..	..	1	5	8	15	19	53	41	142
Worthington..	..	..	5	7	13	21	17	19	82
Union Rotary.....	..	..	..	1	3	1	1	..	6
Hersey.....	..	..	..	1	..	1	1	1	4
Buffalo.....	..	..	..	..	..	..	1	5	6
Thomson.....	..	..	..	2	..	..	3	..	5
Elevator Counters ...	33	..	..	..	..	..	..	..	33
Totals... ..	33	1	10	19	31	42	76	66	278

The inspection and maintenance of meters cost \$180.00 for the year. While none have failed, a small number have been replaced by other makes or larger size when too rapid moving existed, causing an unpleasant noise. All have been set with a stop valve on the inlet

side, and replacing tubes left with the meters to facilitate the taking out for repairs or testing.

There are 25 sewing machine motors in use in the city at this date.

The quantity of water metered this year was 389,929,756 gallons.

# ENGINE RECORD FOR THE YEAR ENDED

MONTHS.	No. of days pump- ing Engine No. 1.	No. of days pump- ing Engine No. 2.	Total days pump- ing.	Average pumping time.	Total revolutions per month.	Average per min- ute.	Starting and book-
March, 1897 .....	23	10	33	H. M. 24.00	698,500	14.62	8
April .....	25 1/2	15 1/2	41	23.39	804,337	13.83	10
May .....	26	22	48	23.31	901,841	13.31	6
June .....	23	21	44	23.27	831,328	13.42	10
July .....	28	28	56	23.40	1,042,666	13.11	7
August .....	29 1/2	20 1/2	50	23.51	978,940	13.68	4
September .....	24	25	49	23.52	938,506	13.37	12
October .....	19	27	46	23.45	915,545	13.96	9
November .....	21	17	38	24.00	795,708	14.56	5
December .....	15	11	26	23.38	513,180	13.92	26
January, 1898 .....	18 1/2	12 1/2	31	23.56	572,276	15.10	6
February .....	22 1/4	5 3/4	28	23.47	614,207	15.37	6
Shortage .....	..	..	..	..	..	..	..
Total, 1897 .....	274 3/4	215 1/4	490	23.45	9,707,094	13.90	113
Total and av. for 1896	290	285	575	22.22	10,469,348	13.57	139
" " " 1895	230 3/4	229 1/4	460	22.12	8,945,466	14.59	85
" " " 1894	146	215	361	23.39	7,947,775	15.51	59
" " " 1893	196 2/8	156 1/8	353	23.46	7,753,712	15.40	56
" " " 1892	149	201	350	23.43	7,613,753	15.29	75
" " " 1891	158	167	325	23.23	6,909,520	15.15	109
" " " 1890	129	104	233	21.39	4,507,358	14.88	266
" " " 1889	177	136	313	21.30	5,985,703	14.74	218
" " " 1888	101	197	298	22.28	5,997,343	14.75	182
" " " 1887	150	158	308	22.46	6,520,619	15.34	156
" " " 1886	109	202	311	22.27	6,492,460	15.47	138
" " " 1885	63	208	271	22.00	5,625,714	15.59	202
" " " 1884	175	133	308	20.58	6,095,775	15.30	233
" " " 1883	95	238	333	14.43	4,599,981	15.6	701
" " " 1882	91	161	252	13.47	3,239,261	15.5	601
" " " 1881	159	176	335	13.35	4,175,129	15.3	778

# OPERATING EXPENSES FOR THE YEAR ENDED FEBRUARY 28, 1898.

MONTHS.	COAL.		Engineers, Firemen and La- borers.	REPAIRS.			SUPPLIES.			GENERAL EXPENSES.			TOTAL.
	Tons.	Cost.		Engines.	Boilers.	Buildings and Grounds.	Oil, &c.	Tools.	Inciden- tals.	Gas.	Tele- phone.	Superin- tendence.	
March, 1897.	374 25	\$1,006 73	\$1,059 10	\$53 95	\$36 20	\$ . . .	\$ . . .	\$ . . .	\$31 99	\$63 80	\$8 33	\$83 33	\$2 343 52
April . . . .	425 80	1 145 40	1 377 13	10 90	88 85	15 75	77 83	40 79	63 71	58 59	8 33	83 33	2 973 61
May . . . . .	472 74	1 268 94	1 196 60	72 64	50 88	1 30	45 00	93 00	12 41	52 52	8 34	83 34	2 885 87
June . . . . .	438 92	1 114 86	1 154 71	336 56	19 25	.....	49 10	34 35	167 17	46 71	8 33	83 33	3 014 37
July . . . . .	525 81	1 335 56	1 715 69	263 04	9 50	46 60	.....	5 46	13 62	55 62	8 33	83 33	3 536 75
August . . . .	488 46	1 240 69	1 255 17	136 98	114 95	190 43	76 50	57 00	48 10	59 54	8 34	83 34	3 271 04
September . .	474 45	1 205 10	1 357 74	23 25	6 60	327 03	45 90	.....	12 50	59 54	8 33	83 33	3 129 32
October . . . .	460 68	1 170 13	1 621 38	199 97	36 90	138 20	47 25	7 63	9 35	66 69	8 33	83 33	3 380 16
November . . .	406 75	1 033 15	1 084 36	90 89	43 65	25 43	45 90	101 28	50 72	65 07	8 34	83 34	2 632 13
December . . .	272 34	691 74	1 273 25	34 64	87 79	2 07	47 72	19 00	34 19	66 56	8 33	83 33	2 348 62
January, 1898	362 64	921 11	868 99	296 56	.....	170 20	.....	7 21	9 35	68 58	8 33	83 33	2 433 66
February . . .	330 22	838 76	843 39	243 55	.....	418 29	46 80	29 55	10 63	67 64	8 34	83 34	2 590 29
Shortage . . .	90 24	242 74	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	242 74
Total, 1897-8	5 123 30	13 214 91	14 807 51	1 762 95	404 57	1 338 30	482 90	395 27	463 74	730 92	100 00	1 000 00	\$31 791 08
1896.	5 524 46	14 765 66	16 081 88	2 465 51	1 503 85	3 752 81	550 96	311 85	598 47	790 59	100 00	1 000 00	\$41 921 58
1895.	4 527 80	11 835 15	13 080 87	1 247 07	5 683 77	553 66	494 29	170 59	404 77	612 45	100 00	1 000 00	35 182 62
1894.	4 667 32	11 477 68	11 449 09	1 277 02	8 057 21	367 80	277 48	223 73	298 61	568 50	100 00	1 000 00	31 097 03
1893.	4 253 50	9 913 81	11 299 26	585 53	4 148 65	760 91	309 79	114 26	251 89	593 25	100 00	1 000 00	29 077 35
1892.	4 057 24	9 589 84	9 912 75	682 96	2 444 79	799 98	365 53	177 33	212 86	677 05	100 00	1 000 00	25 963 09
1891.	3 524 08	8 633 29	8 230 41	1 314 36	1 785 15	800 52	417 77	139 35	329 22	529 05	100 00	1 000 00	23 288 12
1890	2 311 64	5 783 06	8 169 39	409 15	1 617 86	782 61	209 81	78 84	212 47	414 45	100 00	1 000 00	18 777 64
1889.	3 003 90	7 830 77	8 150 19	72 88	1 576 36	932 97	133 93	52 45	614 96	487 95	100 00	1 000 00	20 952 46
1888.	3 124 60	8 832 42	8 243 18	240 52	3 748 70	688 08	292 02	25 14	349 83	548 75	100 00	1 000 00	24 068 64
1887.	3 201 08	8 919 24	8 087 60	257 74	2 004 31	65 89	338 18	33 19	325 56	565 99	100 00	1 000 00	21 697 71
1886	3 277 77	8 190 61	8 048 50	781 56	962 87	385 98	362 59	107 71	446 28	773 00	100 00	1 000 00	21 159 10
1885.	2 677 90	7 864 43	8 073 02	872 59	5 743 97	894 88	317 41	79 49	602 19	646 80	100 00	1 000 00	26 234 78
1884.	2 916 60	12 069 97	7 106 95	.....	8 195 07	852 74	.....	.....	822 12	749 47	83 10	916 67	30 862 49
1883.	2 242 10	10 118 86	5 445 79	.....	.....	902 12	.....	.....	1 080 83	352 05	222 70	818 47	19 013 97
1882.	1 613 89	7 334 49	4 872 99	.....	.....	1 166 25	.....	.....	894 01	304 80	83 33	583 33	15 239 11
1881.	2 141 60	9 938 01	4 615 41	.....	.....	920 50	.....	.....	1 464 48	365 75	226 67	1 000 00	18 530 83



# ENGINE RECORD FOR THE YEAR ENDED FEBRUARY 28, 1897.

TWO SETS OF HOLLY  
"QUADRUPLEX" ENGINES.

MONTHS.	No. of days pump- ing Engine No. 1.		No. of days pump- ing Engine No. 2.		Total days pump- ing.	Average pumping time.	Total revolutions per month.	Average per min- ute.	COAL.			Ashes, per cent.	Gallons pumped per month, de- ducting 4 per cent. for loss of action.	Average No. galls. pumped per lb of coal.	Average No. galls. raised 100 feet per lb. of coal.	Average head against pumps.	Duty in lbs. of water raised ft. high per 100 lbs. coal—calculation on total coal.
									Starting and banking fires.	Pumping.	TOTAL.						
March, 1897	23	10	33	24	00	H. M.	698 500	14.62	8,673	829,635	838,308	17.79	202,830,989	241.95	585.52	242	48,832 855
April	25½	15½	41	23	39		804,337	13.83	10,200	943,596	953,796	18.10	233,564,022	244.88	592.61	242	49,423,314
May	26	22	48	23	31		901,841	13.31	6,400	1,052,541	1,058,941	17.96	261,877,311	247.30	598.47	242	49,912 293
June	23	21	44	23	27		831,328	13.42	10,800	972 379	838,179	18.07	241,401,690	245.53	594.18	242	49,555,188
July	28	28	56	23	41		1,042,666	13.11	7,200	1,170,607	1,177,807	18.41	302,770,187	257.06	622.09	242	51,882,440
August	29½	20½	50	23	51		978,940	13.68	4,800	1,089,358	1,094,158	18.68	284,265,380	259.80	626.72	242	52,435,492
September	24	25	49	23	52		938,506	13.37	12,000	1,050,774	1,062,774	18.20	272,524,123	256.41	620.51	242	51,754,182
October	19	27	46	23	45		915,545	13.96	9,600	1,022,338	1,031,938	18.54	265,856,690	257.63	623.46	242	51,996,655
November	21	17	38	24	00		795,708	14.56	5,200	905 913	911,113	18.08	231,058,326	253.60	613.71	242	51,183,596
December	15	11	26	23	38		513 180	13.92	26,000	584,046	610,046	18.41	149,017,619	244.27	591.13	242	49,301,567
January, 1898	18½	12½	31	23	56		572,276	15.10	6,000	806,308	812,308	17.54	195,216,043	240.32	581.57	242	48,503,848
February	22¼	5¼	28	23	47		614,267	15.37	6,400	733,300	739,700	17.43	178,371,343	241.14	583.56	242	48,668,527
Shortage										202 131	202,131						
Total, 1897	274½	215½	490	23	45		9 707,094	13.90	113,273	11 362,926	11,476,193	17.81	2,818,753,723	245.62	594.40	242	49,572,487
Total and av. for 1896	290	285	575	22	22		10,469,348	13.57	139,350	12,235,431	12,374,781	17.81	2,973,988,012	240.24	581.38	242	48,504,630
" " " 1895	230½	229½	460	22	12		8,945,466	14.59	85,092	10,057,196	10,142,288	18.10	2,597,591,573	256.11	619.79	242	51,691,168
" " " 1894	146	215	361	23	39		7 947 775	15.51	59,400	10 395 399	10,454 799	16.77	2,307,881,205	220.75	534.21	242	44 559,915
" " " 1893	196½	156½	353	23	46		7 753 712	15.40	56,500	9,471 321	9 527 821	18.05	2,251 529 094	236.21	581.87	242	47,646,180
" " " 1892	149	201	350	23	43		7,613 753	15.29	75 500	9,012 723	9 088 223	18.02	2 210,887 684	243.27	588.71	242	49 098,601
" " " 1891	158	167	325	23	23		6 909 520	15.15	109,660	7 784 277	7 893 937	18.31	2 006,391 944	254.17	615.09	242	51,298 366
" " " 1890	129	104	233	21	39		4 507 358	14.88	266,791	4 911 297	5 178 088	19.74	1 306 773 232	252.3	610.60	242	50 934 520
" " " 1889	177	136	313	21	30		5 985 703	14.74	218 550	6 531,126	6 749,676	17.9	1 736,863,103	254.4	623.15	242	51,471,826
" " " 1888	101	197	298	22	28		5 997 343	14.75	182 060	6 738,207	6 930,267	18.5	1 741,866 964	252.5	611.05	242	51,082,700
" " " 1887	150	158	308	22	46		6 520 619	15.34	156,801	7,014 514	7,171,315	16.6	1 859,926 727	256.0	619.5	242	52,485,070
" " " 1886	109	202	311	22	27		6 492 460	15.47	138,689	6 759 038	7,344,717	15.5	1 889 414 858	257.2	622.4	242	51,847,919
" " " 1885	63	208	271	22	00		5 625 714	15.59	202 503	5 798 890	6 001 393	15.5	1 630 500 310	280.0	677.6	242	55 415,409
" " " 1884	175	133	308	20	58		6 095 775	15.30	233,935	6 107 853	6,341,788	19.0	1 767,004,849	272.0	658.7	242	54,952 007
" " " 1883	95	238	333	14	43		4 599 981	15.6	701,940	4 230,786	4,932,726	18.8	1,333,626 492	270.0	653.4	242	54 428,220
" " " 1882	91	161	252	13	47		3 239,261	15.5	601 878	3,014,271	3,616 149	18.6	943,562,395	260.0	629.2	242	53 036,527
" " " 1881	159	176	335	13	35		4 175,129	15.3	778 210	4 018 420	4,779 230	18.8	1,210,044,908	252.0	609.8	242	50 799,672



FEBRUARY 28, 1897.

TWO SETS OF HOLLY  
"QUADRUPLEX" ENGINES.

COAL.		Ashes, per cent.	Gallons pumped per month, deducting 4 per cent. for loss of action.	Ave'ge No. galls. pumped per lb of coal.	Ave'ge No. galls. raised 100 feet per 1 lb. of coal.	Average head against pumps.	Duty in lbs. of water raised 1 ft. high per 100 lbs. coal—calculation on total coal.
Pumping.	TOTAL.						
829,635	838,308	17.79	202,830,989	241.95	585.52	242	48,832 855
943,596	953,796	18.10	233,564,022	244.88	592.61	242	49 423.314
1,052,541	1,058,941	17.96	261,877,311	247.30	598.47	242	49,912 293
972 379	983,179	18.07	241,401,690	245.53	594.18	242	49,555,188
1,170,607	1,177,807	18.41	302,770,187	257.06	622.09	242	51,882,440
1,089,358	1,094,158	18.68	284,265,380	259.80	626.72	242	52,435,492
1,050,774	1,062,774	18.20	272,524,123	256.41	620.51	242	51,754,182
1,022,338	1,031,938	18.54	265,856,690	257.63	623.46	242	51,996,655
905 913	911,113	18.08	231,058,326	253.60	613.71	242	51,183,596
584,040	610,040	18.41	149,017,619	244.27	591.13	242	49,301,567
806,308	812,308	17.54	195,216,043	240.32	581.57	242	48,503,848
733,300	739,700	17.43	178,371,343	241.14	583.56	242	48,668,827
202 131	202,131	.....	.....	.....	.....	.....	.....
11 362,920	11,476,193	17.81	2,818,753,723	245.62	594.40	242	49,572,487
12,235,431	12,374,781	17.81	2,973,988,612	240.24	581.38	242	48,504,630
10,057,196	10,142,288	18.10	2,597,591,573	256.11	619.79	242	51,691,168
10 395 399	10,454 799	16.77	2,307,881,265	220.75	534.21	242	44 550.915
9,471 321	9,527 821	18.05	2,251 529 094	236.21	581.87	242	47,646,180
9,012 723	9,088 223	18.02	2 210,887 684	243.27	588.71	242	49 098,601
7 784 277	7 893 937	18.31	2 006,391 944	254.17	615.09	242	51,298 366
4 911 297	5,178 088	19.74	1 306 773 232	252.3	610.60	242	50 934,520
6,531,126	6,749,676	17.9	1 736,863,103	254.4	623.15	242	51,471,826
6,738,207	6,930,267	18.5	1,741,866 964	252.5	611.05	242	51,082,700
7,014 514	7,171,315	16.6	1 859,926 727	256.0	619.5	242	52,485,070
6,759 038	7,344,717	15.5	1 889,414 858	257.2	622.4	242	51,847,919
5,798,890	6 001,393	15.5	1,630,500,310	280.0	677.6	242	55 415,409
6 107 853	6,341,788	19.0	1,767,004,849	272.0	658.7	242	54,952,007
4 230,786	4,932,726	18.8	1,333,626 492	270.0	653.4	242	54 428,220
3,014,271	3,616 149	18.6	943,562,395	260.0	629.2	242	53 036,527
4 018 420	4,779,230	18.8	1,210,044 908	252.0	609.8	242	50,799,672

## Pumping Service.

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The accompanying tables present in monthly detail the operation of the pumping machinery for the past year, together with the cost of the various items of coal, labor, repairs, gas, &c., and an annual summary of the same since 1881.

The boilers were under steam every day of the past year, their number varying with the demand for water.

The engines were operated singly on 206 days, and combined on 142 days. They were idle 17 days.

Engine No. 1 was in operation on  $274\frac{3}{4}$  days, an average of 23 hours and 51 minutes per day, and raised 1,606,182,449 gallons of water into the reservoir, an average of 5,845,978 gallons for each day it ran.

Engine No. 2 was in operation on  $215\frac{1}{4}$  days, an average of 23 hours and 38 minutes per day, and pumped 1,212,571,274 gallons of water, an average of 5,633,316 gallons for each day it ran.

Taken as a whole, the pumping engines were in operation either singly or combined 348 days, during an aggregate of 11,641 hours and 7 minutes, an average of 23 hours and 45 minutes per day, and raised 2,818,753,723 gallons of water, or an average of 8,099,867 for each day they ran.

# COAL ACCOUNT.

CONSUMPTION FOR THE YEAR 1897-8.

MONTHS.	ANTHRACITE BUCKWHEAT.			
	TONS.	PRICE.	AMOUNT.	POUNDS.
March, 1897.....	374.25	\$2.69	\$1,006.73	838,308
April.....	425.80	2.69	1,145.40	953,796
May.....	464.53 18.21	2.69 2.54	1,222.89 46.25	1,018,141 40,800
June.....	438.92	2.54	1,114.86	933,179
July.....	525.81	2.54	1,335.56	1,177,807
August.....	488.46	2.54	1,240.69	1,094,158
September.....	474.45	2.54	1,205.10	1,062,774
October.....	460.68	2.54	1,170.13	1,031,938
November.....	406.75	2.54	1,033.15	911,113
December.....	272.34	2.54	691.74	610,040
January, 1898.....	362.64	2.54	921.11	812,308
February.....	330.22	2.54	838.76	739,700
Shortage.....	90.24	2.69	242.74	202,131
Totals.....	5,123.30	\$2.58	\$13,214.91	11,476,193

The cost of operating the Pumping works during the year ended February 28, 1898, was as follows :

Cost of coal and wood.....	\$13,214 91
“ labor.....	14,807 51
“ repairs.....	3,595 83
“ supplies.....	1,341.91
“ superintendence .....	1,000 00
“ gas.....	730 92
“ telephone.....	100 00
Total.....	\$34,791 08



# PUMPAGE, DAYS, HOURS, MINUTES AND AVERAGES—1897-8.

MONTHS.	ENGINE NO. 1.				ENGINE NO. 2.				MONTHLY PUMPAGE OF WATER.		
	Days.	Hours.	Min-utes.	Average.	Days.	Hours.	Min-utes.	Average.	Engine No. 1.	Engine No. 2.	
March, 1897 .....	23	568	36	H. M. 24.00	10	227	44	H. M. 24.00	147,289,273	55,541,716	
April. ....	25½	604	45	23.43	15½	364	50	23.32	148,633,445	84,930,577	
May. ....	26	603	50	23.13	22	525	07	23.52	141,523,471	120,353,840	
June. ....	23	546	07	23.44	21	485	50	23.08	128,902,941	112,498,749	
July. ....	28	666	09	23.47	28	659	19	23.33	152,685,419	150,084,768	
August. ....	29½	706	35	23.57	20½	486	08	23.43	172,467,030	111,798,350	
September. ....	24	571	49	23.50	25	597	41	23.55	132,647,401	139,876,722	
October. ....	19	452	57	23.50	27	639	52	23.42	107,142,385	158,714,305	
November. ....	21	508	46	24.00	17	402	39	24.00	130,174,519	100,883,807	
December. ....	15	350	07	23.20	11	264	14	24.00	85,714,314	63,303,305	
January, 1898. . .	18½	441	08	23.51	12½	300	52	24.00	116,844,298	78,371,745	
February. ....	22¼	532	25	23.51	5¾	133	37	23.14	142,157,953	36,213,390	
Totals. ....	274¾	6,553	14	23.51	215¼	5,087	53	23.38	1,606,182,449	1,212,571,274	

Rain in in.	1895.		1896.		1897.	
	Gallons Pumped.	Rain Fall in in.	Gallons Pumped.	Rain Fall in in.	Gallons Pumped.	Rain Fall in in.
85	194,797,894	1.31	163,566,568	4.66	202,830,989	1.85
02	176,619,476	3.09	221,485,922	.98	233,564,022	3.12
64	185,578,304	1.72	242,589,057	1.55	261,877,311	4.69
29	192,362,761	1.72	273,671,708	2.49	241,401,690	4.45
96	206,264,451	4.02	269,855,524	3.57	302,770,187	6.67
26	216,291,881	3.14	258,167,406	2.25	284,265,380	4.43
18	220,644,399	1.80	309,620,851	3.31	272,524,123	1.87
62	239,504,922	2.35	278,480,414	1.53	265,856,690	1.01
96	227,236,043	4.78	221,385,160	1.80	231,058,326	4.65
18	255,992,164	2.59	250,718,268	.73	149,017,619	4.38
65	258,185,119	.98	253,887,992	1.62	195,216,043	2.96
63	224,114,159	4.03	230,559,742	2.05	178,371,343	3.57
24	2,597,591,573	31.53	2,973,988,612	26.54	2,818,753,723	43.65
.	7,097,245	....	8,147,914	...	7,722,613	....
.	7,215,532	....	8,472,902	...	8,099,867	....





[illegible]

The total *expenditures* and the items for "repairs" for the seventeen years have been as follows :

1881.....	\$920 50	\$18,530 83
1882.....	1,166 25	15,239 11
1883.....	902 12	19,013 97
1884....	9,047 81	30,862 49
1885.....	7,511 44	26,234 78
1886.....	2,130 41	21,159 10
1887.....	2,327 94	21,697 71
1888.....	4,677 30	24,068 64
1889.....	2,582 21	20,952 46
1890.....	2,809 62	18,777 64
1891.....	3,900 03	23,288 12
1892.....	3,927 73	25,963 09
1893.....	5,495 09	29,077 35
1894.....	9,702 03	35,097 03
1895.....	7,484 50	35,182 62
1896.....	7,722 17	41,921 58
1897....	3,595 83	34,791 08
<hr/>		<hr/>
Total.....	\$75,902 98	\$441,857 60
Mean 17 years .....	\$4,464 88	\$25,991 62

The total yearly expense of maintaining the pumping station, divided by the quantity of water pumped in each year to lower Oakwood reservoir gives the

Cost per million gallons raised 231 feet high,

1881.	1882.	1883.	1884.	1885.	1886.	1887.
\$15.20.	\$16.12.	\$14.24.	\$17.41.	\$16.09.	\$11.20.	\$11.66.
1888.	1889.	1890.	1891.	1892.	1893.	1894.
\$13.82.	\$12.07.	\$14.37.	\$11.60.	\$11.75.	\$12.91	\$15.20.
1895.	1896.	1897.				
\$13.54.	\$14.09.	\$12.34	Mean in 17 years.....			
			\$13.74			

Cost per million gallons raised one foot high in cents :

1881.	1882.	1883.	1884.	1885.	1886.	1887.
6.58.	6.97.	6.16.	7.53.	6.96.	4.84.	5.05.
1888.	1889.	1890.	1891.	1892.	1893.	1894.
6.0	5.22.	6.22.	5.02.	5.09.	5.59.	6.58.
1895.	1896.	1897.				
5.86.	6.10	5.34	Mean in 17 years. ....			
			5.95			

The amount of water pumped since the starting of the log, the rain-fall for each month and the average pumpage for each month, is shown in the table of "Gallons of Water Pumped."

The noticeable increase in the amount of water pumped in 1884 was largely in consequence of changing the distributing reservoir of the Low Service from a head of 105 to 202 feet.

With the rated capacity of one set of pumping machinery at six million gallons per day for the entire year,

In 1881 the pumpage equaled 55.2 per cent. of the capacity.

In 1882	"	"	43.1	"	"	"
In 1883	"	"	60.7	"	"	"
In 1884	"	"	80.7	"	"	"
In 1885	"	"	74.4	"	"	"
In 1886	"	"	86.3	"	"	"
In 1887	"	"	84.7	"	"	"
In 1888	"	"	79.5	"	"	"
In 1889	"	"	79.3	"	"	"
In 1890	"	"	59.6	"	"	"
In 1891	"	"	91.3	"	"	"
In 1892	"	"	100.9	"	"	"
In 1893	"	"	102.8	"	"	"
In 1894	"	"	105.4	"	"	"
In 1895	"	"	118.3	"	"	"
In 1896	"	"	135.8	"	"	"
In 1897	"	"	128.7	"	"	"

The maximum daily pumpage was on August 20, 1897, 10,935,322 gallons. The maximum monthly pumpage was in July, amounting to 302,770,187 gallons.

The average for 348 days pumping was 8,099,867 gallons.

The permanent force at the pumping station under Chief Engineer Soucy remains unchanged except that Michael S. Halpin was appointed oiler in place of

Michael H. Keating, deceased. The employees, both permanent and temporary are entitled to commendation for the prompt and intelligent manner in which they have discharged their duties.

The following repairs and additions to the buildings and equipments were made since last report:

Completed shaft to tunnel, by lining with brick and covering with large flag stone; renewed 16 exhaust valves and seats, also joints at bottom chamber right back No. 2 engine and joints on pressure chamber on same engine. Repaired coal car transmitter and coal bucket, also shed in rear of main building and copper coils in feed-water heater; placed new tin roof on main building and painted all the tin roofs of the other buildings. Pointed up with cement north and south ends of stone dock. Constructed two bents, one for hoisting heater, the other for raising main shaft of pumping engines. Repaired floor and floor timbers in main building. Planed side chucks, bottom bearings and leveled main shaft of No. 2 engine. Built dressing room for the men in southeast corner of engine room and two moveable platforms to assist in removing anchor ice at inlet pier.

#### RECOMMENDATIONS.

The following work to be done the coming year is requested and recommended by Chief Engineer Soucy:

Repair and paint cornice of main building; build a larger shed for storage of materials in rear of main building; renew and make new bolts for valve motion; examine main shaft and bearings of No. 1 engine; grade and sod around shaft of tunnel; complete the street sidewalks around station; improve the present system of air pumps or apply an independent condenser; install a larger feed pump for boilers.

#### CONCLUSION.

I would recommend the laying of a 12-inch main in Fifteenth street from its present termination near Hut-

ton street, to connect with a similar sized main at South street, a distance of about 4,000 feet, when the finances of the department will permit the expense. This improvement would furnish a much needed additional 12-inch feeder for the High service, from the corner of Hoosick street and Burdett avenue to the Pawling avenue bridge. I would also recommend the exterior painting of the dwelling and storehouse in rear of the office, also the reconstructing of the present unsightly well-house at Oakwood reservoir and the painting of the same, as well as painting such of the other well-houses as require it and the fire hydrants throughout the city.

Respectfully submitted,

EDWARD DOLAN,

*Superintendent.*



# Summary of Statistics.

REPORT OF 1897.

*In accordance with suggestions adopted by the New England  
Water Works Association.*

## Troy Water Works, Rensselaer County, N. Y.

Population by State Census, 1891.... 65,000.  
Date of construction..... 1833 to 1898.  
By whom owned..... The City of Troy.

### SOURCE OF SUPPLY:

From a series of five artificial storage reservoirs constructed in the valley of the Piscawen-kill, whose watershed is 1,363 acres; and the Hudson river at Lansingburgh, three miles above Troy.

### MODE OF SUPPLY:

The water collected is distributed by gravitation, as is also the Hudson river water after being pumped to an elevation of 231 feet.

### PUMPING.

#### 1. Builders of Pumping Machinery:

Holly Manufacturing Co., of Lockport, N. Y., two sets of quadruplex engines of 6,000,000 gallons capacity each, with piston speed of 90 feet.

#### Dimensions of parts:

Steam cylinders to each engine. ....  
Diameter..... 27 inches  
Length of stroke..... 36 inches

Air pumps and condensers, each engine.....	2
Diameter.....	29.75 inches
Stroke.....	30 inches
Fly wheel to each engine.....	1
Diameter.....	13.33 feet
Width of rim.....	12 inches
Depth of rim.....	12 inches
Weight.....	9 tons
Extreme length of each engine.....	48.5 feet
Extreme width of each engine.....	18.83 feet
Extreme height of each engine.....	31 feet
Pump cylinders to each engine.....	4
Diameter.....	17.75 inches
Length of stroke.....	36 inches
Displacement per revolution, U. S.....	302.48 galls
Number of valves in each pump.....	832
Diameter of each valve.....	1.375 inches
Lift of valve.....	.33 inches
Diameter of suction and discharge pipe, each pump.....	14 inches
Length of force main.....	16,753 feet
Diameter of force main.....	30 inches
Height of pumps above low water.....	20 feet
Height of summit of force main above low water.....	234.07 feet
Height of wash stone gate house, lower Oakwood.....	231 feet
Boilers, "McMurray's setting," number of.....	4
Diameter of shell.....	6½ feet
Length of shell.....	18 feet
Number of tubes, each boiler.....	154
Diameter of tubes.....	3 inches
Total heating surface, each boiler..	2,442 sq. ft
Diameter of chimney flue.....	4.33 feet
Height of chimney above grade.....	100 feet

2.	Description of coal used :	
	Anthracite.	
	Size—Buckwheat.	
	Price—\$2.69, 2.54.	
	Percentage of ashes .....	17.81
	Wood, price per cord .....	\$5.00
3.	Coal consumed for the year, in pounds :	11,476,193
4.	Total pumpage for the year, in gallons.	2,818,753,723
5.	Average static head against which pumps work .....	231 feet
6.	Average dynamic head against which pumps work .....	242 feet
7.	Number of gallons pumped per pound of coal,	245.62
8.	Duty, in foot pounds, per 100 pounds of coal, using following formula, making no deductions for starting, banking fires, heating buildings or anything else :	
	gallons pumped x 8.34 lbs. x 100 x dynamic head	
	Duty = <hr/>	
	Total fuel consumed	
	= <hr/>	49,572,487
	Cost of pumping figured on pumping station expenses, viz. ....	\$34,791.08
9.	Per million gallons raised against aver- age dynamic head into reservoir....	12.34
10.	Per million gallons raised one foot high, dynamic .....	.051
	Cost of pumping and gravity supply combined, figured on total mainten- ance, and interest at 4 per cent. on construction .....	\$112,389.89
11.	Cost per million gallons .....	30.70
12.	Receipts per million gallons .....	27.13

## CONSUMPTION.

1	Total population at date, State census, 1891.....	65,000
2.	Estimated population on lines of pipe to date.....	60,000
3.	Estimated population supplied at date	58,000
4.	Total number of gallons consumed for the year.....	3,660,538,723
5.	Passed through domestic meters }	} .... 389,929 756
6.	Passed through manuf. meters.. }	
7.	Average daily consumption in gallons,	10,028,873
8.	Gallons per day to each inhabitant...	154
9.	Gallons per day to each consumer....	172
10.	Gallons per day to each tap.....	1,423

## DISTRIBUTION.

1.	Kind of pipe used.....	cast iron
2.	Size.....	4 to 30-inch
3.	Extended.....	3,603 feet
4.	Discontinued.....	16
5.	Total now in use .....	58.81 miles
6.	Cost of repairs per mile.....	\$5.74
7.	Number of leaks for the year.....	20
8.	Small distribution pipe, less than 4-inch..	2,976 feet
9.	Hydrants added.....	7
10.	Number now in use .....	762
11.	Stop gates added.....	8
12.	Number now in use.....	1,272
13.	Small stop gates, less than 4 inches .....	<i>no record</i>
14.	Number of blow offs.....	37
15.	Range of pressure day and night :	
	High service.....	11 to 107 pounds
	Middle service.....	9 to 105 "
	Low service.....	11 to 60 "

## SERVICES.

16.	Kind of pipe used.....	AA lead and cast iron
17.	Size.....	$\frac{3}{4}$ to 6 inch
18.	Extended.....	<i>no record</i>
19.	Discontinued.....	<i>no record</i>
20.	Total now in use.....	7,045
21.	Service pipes added.....	194
22.	Average length of service estimate.....	35 feet
23.	Average cost of service estimated.....	\$25.00
24.	Meters added.....	15
25.	Meters discontinued.....	4
26.	Number now in use.....	278

# FINANCIAL.

## MAINTENANCE.

### EXPENDITURES.

AA. Management and repairs.... \$61,112 69

BB. Interest on debt..... 10,897 50

CC. ....

{ Total maintenance for year.. \$72,010 19

DD. Amount paid to Sinking Fund

{ for redemption of bonds... 19,137 50

EE. Balance to construction..... 8,177 45

KK. Total..... \$99,325 14

### RECEIPTS.

#### From Consumers:

A. Water rents, fixed rates..... \$72,553 37

B. Water rates, meters, sprinkling,  
etc..... 21,115 38

C. Net receipts from water..... \$93,668 75

D. Miscellaneous, (repairs, rent, etc.) 5,656 39

E. Total..... \$99,325 14

#### From Public Funds:

J. { General appropriation for water

{ General appropriation for debt

K. Gross receipts from all sources. \$99,325 14



# FINANCIAL—CONTINUED.

## CONSTRUCTION.

RECEIPTS.		EXPENDITURES.	
R.	{ Balance from previous year... \$2,308 90	FF.	Extension of mains..... \$2,827 49
	{ Balance from maintenance.... 8,177 45	GG.	New supply..... 1,013 70
S.	.....	HH.	.....
T.	Appropriation from tax levy....	II.	Total construction for year... \$3,841 19
U.	Other sources, (service, private meters).....	JJ.	Balance to coming year..... 6,645 16
V.	Total.....\$10,486 35	KK.	Total .....\$10,486 35

W.	Net cost of Works to this date.....	\$1,281,930 20
X.	Bonded debt at this date.....	273,500 00
Y.	Sinking fund.....	51,156 25
Z.	Average rate of interest.....	4 per cent.





REPORT  
ON  
An Additional Water Supply

FOR THE  
CITY OF TROY,  
MADE TO THE WATER COMMISSIONERS,

JUNE 18, 1897,

BY  
WILLIAM G. RAYMOND, C. E.,

CHIEF ENGINEER, NEW SUPPLY;

TOGETHER WITH

ANALYSES OF WATERS OF THE  
TOMHANNOCK CREEK,

BY  
DR. WILLIAM P. MASON, CHEMIST OF THE BOARD,

AND AN ENDORSEMENT OF THE PLAN BY  
ELNATHAN SWEET, CONSULTING ENGINEER.

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TROY PRESS PRINT, FULTON AND FOURTH STS.  
1897.

This report is made in compliance with the following resolutions, adopted by the Board of Water Commissioners of the City of Troy, April 19, 1897:

By COM'R ALDEN—

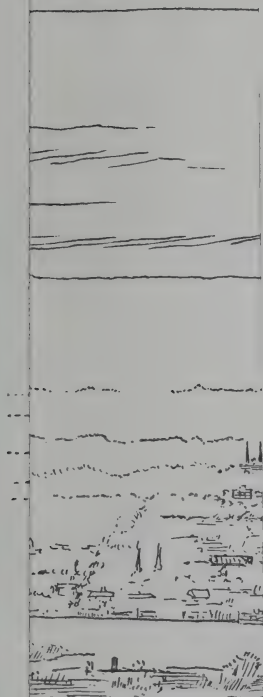
*Resolved*, That the Engineer of this Board be, and he is hereby, instructed to report to the Board, at his early convenience, any and all feasible methods for increasing the supply of water for the city; and he is hereby authorized to make such investigations as will enable him to report detailed estimates of cost of the various possible plans, together with an estimate of cost and efficiency of the various systems of filtration.

*Resolved*, That the Engineer be requested to present such arguments for and against the various possible plans as may occur to him, together with a statement of his judgment as to their relative values from the standpoint of desirability and economy.

*Resolved*, That Dr. Mason be associated with the Engineer in the matter of investigating the subject of filtration and the cost thereof.

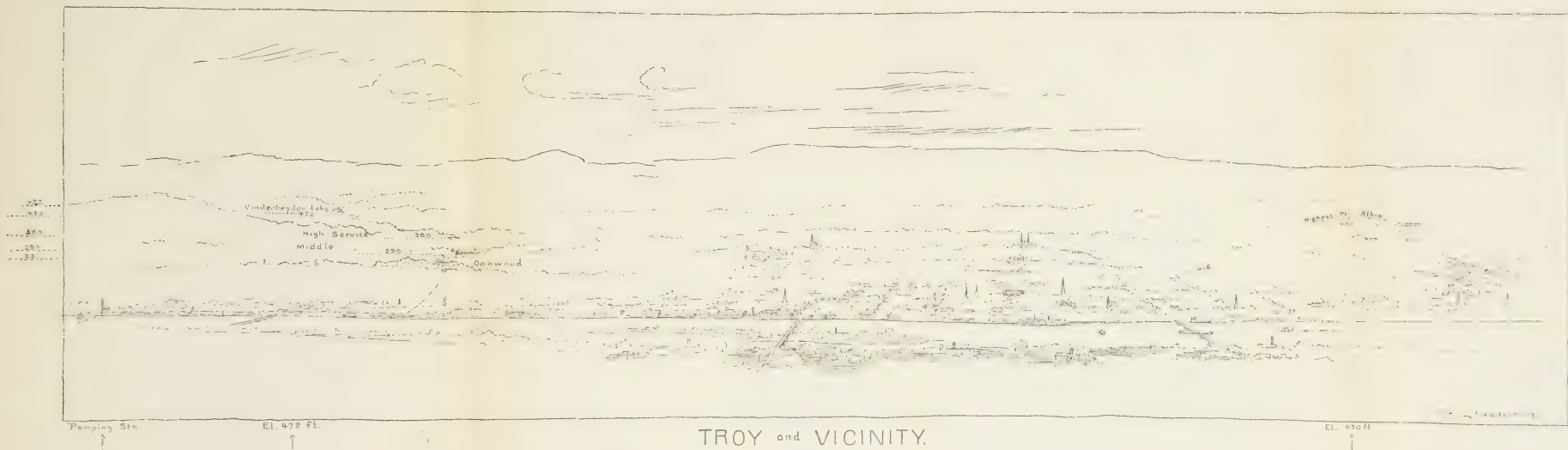
*Resolved*, That the Engineer is authorized to make the above mentioned investigation at an expense not to exceed \$1,000 for all purposes."

Subsequently the Engineer asked for consultation, and in accordance with a resolution, the Board secured the services of Elnathan Sweet, C. E., as consulting engineer.



Y.





# REPORT.

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TROY, N. Y., June 18, 1897.

TO THE HONORABLE BOARD OF WATER COMMISSIONERS,  
CITY OF TROY, NEW YORK.

GENTLEMEN:

Responding to your instructions to investigate for you all available means for increasing the water supply of the city, I have to report as follows:

The general features of the present system of securing water are admirably shown in the accompanying sketch kindly made by Mr. Sanford L. Cluett. This sketch shows why the present high service reservoir can not supply Albia, or any point approximating an elevation of 380 feet. It also shows that if the supply main be extended to Vanderheyden lake, all portions of the city may be supplied. It also shows the relative locations of the pumping station in Lansingburgh, the Oakwood reservoir, into which the pumps are designed to force water, the middle service reservoir, and the Vanderheyden lake, into which, with a total altitude of about 500 feet, including friction, the water must be forced if the high service is to be supplied from the river. The route of the present rising main is shown by a broken line extending from the pumping station to Oakwood reservoir.

The methods that suggest themselves for obtaining more water, are in general, three:

1. Pumping from the Hudson river.
2. Gravity supply from the streams east of the city.
3. Pumping to the low service, and gravity for the high and middle services.

In order that the results of my investigations may not be obscured by the details, I have placed all estimates in the appendix to this report, and have also there discussed the question of mill damages. There is also appended Dr. Mason's report on the water of the Tomhannock creek.

For analyses of the waters of the other streams mentioned herein, except the Deepkill, you are referred to the report of Dr. Mason made in 1893.

In the matter of filtering I have consulted with Dr. Mason, and the results given are approved by him.

#### HUDSON RIVER.

Machinery  
required.

If the Hudson river be chosen as the source of supply, I would advise that two pumps, each of fifteen millions of gallons capacity, and one pump of three millions of gallons capacity, be installed in the Lansingburgh pumping station, enlarged to accommodate them.

The fifteen million gallon pumps are to supply the low and middle services, and the smaller one to supply the high service.

As soon as the demand on the last named service shall become so great as to require the running of the small pump a good portion of the time, it will be necessary to put in a second three million-gallon engine, but I have not included this in my estimates.

As a matter of economy in first cost and operation, these new engines will require new boilers designed to carry greater pressure than those now in use. It will also be economy to lay a new force main of larger diameter than that now laid, and it will be necessary to lay a new force main from the pumping station to Vanderheyden lake. I have estimated on a 38-inch steel riveted pipe for the larger services, and on an 18-inch cast iron pipe for the smaller service.

First cost.

The cost of such a plant as I have outlined will be, including the necessary changes in the buildings and foundations, about \$344,000.

I have based the cost of operation on engines of twice the efficiency of those now in use, and have assumed that there will also be some reduction in the item of labor. These changes bring the cost per million gallons per foot of lift down to about 4 cents. The present cost is 5.6 cents. I think my estimate is full as low as can be obtained. On this basis the annual cost of operation, including a sinking fund for renewals, and interest at four per cent., is \$95 000.

Cost of  
operation.

In computing sinking fund for renewals, I have considered that the annual payment to the sinking fund will be that sum which placed at compound interest at the rate of four per cent., will amount to the cost of the item to be renewed at the end of the assumed life of the item.

#### FILTERING.

Inasmuch as your chemist, Dr. W. P. Mason, has said repeatedly that the Hudson river water should not be used for domestic supply without filtering, I will here consider the cost of this element. The estimated cost for mechanical filters in this latitude is less than that for gravity filters, or natural sand filters, as they are generally called, because of the necessity for covering the filters to insure proper action in cold weather.

Mechanical  
vs.  
Natural.

Moreover, in the case of Troy, land for natural filter beds does not seem to be available in close proximity to any portion of our present pumping system.

It would therefore seem that mechanical filtration, even with somewhat less efficiency, is the proper system to adopt in Troy.

The cost of a mechanical filtration plant is stated at \$10,000 per million gallons daily capacity. Inasmuch as this kind of plant is made up of a large number of units, which may be supplied as needed, I have considered in these estimates a plant of a capacity of twelve millions of gallons daily. The first cost of such a plant will be \$120,000.

Cost.

But it would be folly to filter our water and then turn it into earth-lined uncovered reservoirs, because it would not only be partly spoiled by the earth lining, but it is a fact that filtered water, like ground water, deteriorates by storage in open reservoirs.

The reservoirs receiving the filtered water should be lined and covered. I have not made careful estimates on these items, but it is safe to say that \$80,000 is a low estimate of the cost of properly lining the reservoirs. The covering has not been included. It might cost as much more.

The total first cost of these filters may thus be placed at \$200,000.

The cost of filtering Hudson river water will be not far from \$5.00 per million gallons. Including sinking fund for renewals, and interest on first cost, the annual cost of filtering twelve millions of gallons daily will be about \$36,000.

#### GRAVITY SYSTEMS.

**Sources.** The available sources of supply for a gravity system are several. The Wynantskill, the Quackenkil, and the Poestenkill, will each furnish water to Troy at sufficient altitude to supply all services. The Tomhannock creek will furnish a large quantity of water at an altitude sufficient for the middle and low services. The Deepkill will furnish a supply at an altitude sufficient for the low and middle services. These streams are all that seem to be directly available.

**The Wynantskill.** The Wynantskill, with a water shed, down to the point where its water could be diverted, of twenty square miles, will supply about ten millions of gallons daily in the driest years.

Its water, however, is subject to contamination from the comparatively large and increasing population along its banks. It is, moreover, by far the best developed stream for power, and would doubtless entail a larger



cost for this item. For these reasons I have not made estimates for this stream.

The Quackenkil at the village of the same name can be made to furnish eight millions of gallons daily in the dryest of years by providing storage on its water shed, or on the shed of the Piscawankill. The water of this stream does not need filtering to make it suitable for domestic supply.

The  
Quackenkil.

The care of the necessary reservoirs for the maintenance of the supply from this source will be small. The cost of maintaining the six reservoirs of the present gravity and pumping systems, is about \$1,250 annually, including about \$300 repairs necessitated by the use of brick instead of stone in the construction of the gate houses. From one to five new reservoirs will be needed on the Quackenkil according to the quantity of water required from the stream, and hence I can see no reason for a greater expenditure for the care of these reservoirs than that now entailed by the reservoirs in use. I have, however, estimated that two thousand dollars will cover this item.

The first cost of introducing Quackenkil water to the city will be about as follows, including the cost of riparian rights:

Cost of  
Quackenkil.

For 3 millions of gallons daily.....	\$116,000
For 5 millions of gallons daily.....	240,000
For 8 millions of gallons daily.....	393,000

The annual cost of maintenance, including sinking fund for renewals, and interest on first cost, is estimated to be

For 3 millions of gallons daily.....	\$6,900
For 5 millions of gallons daily.....	11,900
For 8 millions of gallons daily.....	18,200

The Poestenkill at Barberville can be made to yield sixteen millions of gallons daily.

The  
Poestenkill.

In its present condition the water of this stream is not suitable, without filtration, for a domestic supply. This is not due to sewage pollution or pollution from



manufacturing waste, but is due to peatiness arising because of the marsh areas on the watershed. Dr. Mason agrees with me that this condition of the water can be much improved by draining these marshes. The extent to which the peat can be removed is of course uncertain, but it is practically certain that the water can be made equal to that of the Quackenkil, and hence fit for domestic supply. The cost of draining the marshes will be but a fraction of that of a filter plant. It will probably not exceed one tenth of that cost, and certainly will not exceed one fifth.

Cost of  
Poestenkill.

The cost of bringing the water of the Poestenkill to Troy will be about as follows:

For 5 millions of gallons daily.....\$354,000

For 10 millions of gallons daily..... 640,000

The annual cost of operation, including the items of sinking fund and interest, is

For 5 millions of gallons daily..... \$16,800

For 10 millions of gallons daily..... 28,500

The  
Deepkill.

The Deepkill, which is a stream rising near Hayner-ville, and flowing westerly through Grant's Hollow to the Hudson river, is capable of yielding about four millions of gallons daily at a point from which it could be led to the middle service. I have made no close estimates for this stream because of its small capacity, but it is safe to say that it can be brought to the city for \$200,000 should it ever be needed. This would be much cheaper than pumping an equivalent amount from the river.

The  
Tomhannock.

Rising in the mountains north of the Quackenkil, in the towns of Grafton, Brunswick, and Pittstown, are several streams of good water that unite to form what is called the Tomhannock, which flows northwesterly to the Hoosick river.

How  
discovered.

It is proper here to say that my attention was directed to this stream by a careful study of the topographical atlas issued by the United States Geological Survey.

Capacity.

One of the charts of this atlas seemed to indicate that a

single reservoir could be built on this stream—and one that would make the stream good for thirty millions of gallons or more daily—and that the water would be at sufficient altitude to supply, possibly the middle service, certainly the low service. My instrumental examination proves the indications to be correct.

I have made a personal examination of the water shed of this stream, have had its water examined by your chemist, Dr. Mason, and have made such surveys as seemed necessary to determine the feasibility of bringing the water into the low service, and the approximate cost of doing this. These surveys have included sinking test holes at the site of a proposed dam, which holes were carried down from fifty to seventy feet. The bottom seems to be entirely suitable for a foundation for a dam, being a compact clay and gravel for almost the entire depth, with no water.

Surveys  
made.

The site of the dam is rather more than a half mile up stream from the point where the Fitchburg railroad crosses the stream, and about one mile due south from Schaghticoke station.

A dam at this point, about 60 feet high and 325 feet long on top, will make a lake about five miles long, covering from 1,500 to 1,600 acres of land, and capable of holding from five billions to seven billions of gallons, or considerably more than a year's supply. I have not made careful surveys to determine the capacity closely, since the smallest possible capacity is ample for the needs of the city.

Size of  
Reservoir.

Some of the land that would be flowed is valuable and some is not. Recent sales in the vicinity indicate a value of the better portions of less than thirty dollars an acre. I have used fifty dollars in my estimates.

Value of land.

The quality of the water as shown by analysis is not only such as to make it suitable for domestic supply, but it is better than any of the other waters examined, in that there is no peatiness. This fact is made evident to the laymen by the colorlessness of the water.

Quality of  
water.

The water shed tributary to the stream down to the point where the dam would be built is about sixty-five square miles, and it is a clean, wholesome territory.

Mills on  
Tomhannock.

There is but one water power now in use on the stream below the site of the reservoir, and this is a small affair consisting of a country grist mill and saw mill. The mill damages will therefore be nominal, all the powers formerly on the stream having been abandoned as worthless some years since.

Cost of  
Tomhannock.

The cost of constructing a reservoir that will make the stream good for thirty millions of gallons daily, and building the conduit to the city capable of delivering fifteen millions of gallons daily, will not exceed \$788,000, and may be made less by careful detail planning.

The estimated annual cost of operation, including sinking fund to renew the conduit line, and interest on first cost, is \$35,420.

#### COMBINED PUMPING AND GRAVITY.

River and  
Quackenkill.

The only feasible scheme for a combination system that suggests itself to me is to supply the low service by pumping from the Hudson river, and the high and middle services by water from the Quackenkill.

The constructions necessary for this plan would be the two fifteen-million gallon pumping engines and new force main, with accompanying boiler plant and changes in the pumping station buildings already noted, and a pipe line and diverting dam for the Quackenkill water. To the cost of these items must be added the cost of such mill damages as may be involved.

Cost of  
combination  
plan.

My estimate for the first cost of this plan, based on three millions of gallons daily from the Quackenkill, is \$383,000.

The estimated annual cost of operation, including sinking fund and interest, is \$75,000.

Cost if river  
water is  
filtered.

If filtering the Hudson river water is demanded, the first cost is increased to \$583,000, and the annual cost to \$111,000.

## COMPARISON OF PLANS.

My impression is that the foregoing estimates are full high for the gravity plans and are fairly close for the pumping plans, and I am fearful that the filter can not be properly installed for the cost given.

Sufficiency of estimates.

A fair way to compare plants of equal capacity is to capitalize the annual expense of each at a rate of interest that it is probable must be paid for the money to build them. The capacities of the several plants herein suggested are, when combined in the proper way, so nearly equal that this is a good method to adopt in this case.

Methods of comparison.

Another way to compare them is to compare simply the gross annual cost, and showing at the same time the cost per unit of measure. This unit is perhaps best taken as 1,000 gallons.

The comparisons are based on a supply of eighteen millions of gallons daily, three millions for the high and middle services, and fifteen millions for the low service. In the case of complete supply from the Hudson river, I have assumed one million gallons for the middle service, and fourteen millions for the low service. And in all cases I have assumed a filter plant of but twelve millions of gallons capacity, and filtering but this amount.

I have assumed four per cent. interest. This is probably high, but the lower the rate the more economical becomes the gravity plan hereinafter advised.

The reduced operating expense of the pumping plant, owing to the fact that not the whole of the capacity will be required at once, will change the comparisons in degree only. The final results will have the same economical order.

The following is a tabulated statement of the cost of the several plans:

Comparative cost.	Plan.	First cost.	Annual cost.	Capitalized cost.	Cost per 1,000 gals. Cents.
	Hudson river....	\$344,000	\$95,000	\$2,375,000	1.446
	Hudson river and filtering .....	544,000	131,000	3,275,000	1.994
	Hudson river and Quackenkil... ..	383,000	75,000	1,875,000	1.142
	Same, filtering the river water ...	583,000	111,000	2,775,000	1.689
	Quackenkil and Poestenkill ...	1,033,000	46,000	1,150,000	0.700
	Tomhannock and Quackenkil...	904,000	42,320	1,058,000	0.629

Recommendation.

There is really little left for me to say by way of argument, the figures speaking for themselves. My recommendation is made in accordance with them and Dr. Mason's report. It is that the Quackenkil be used for the high and middle services and the Tomhannock for the low service. There is ample leeway between this plan and any plan involving pumping, for errors of estimate in the matter of mill damages or construction work.

Inexhaustible supply.

It has been said by those who favor the pumping system that even should the gravity plan be shown to be the more economical, they will still say that the river offers an inexhaustible supply. In reply to this it may be urged that the several streams herein mentioned offer a practically inexhaustible supply: That the Tomhannock alone is good for another fifteen millions of gallons at the additional expense of a conduit line only.

If this argument is not sufficient, I would say that it seems to me to be wise to get all the water we can at small price, and resort to the more expensive and less pure supply only when all that is possible of the better and cheaper supply is obtained.

Capacity of streams.

The argument has also been urged that the capacity of the mountain streams is a very doubtful quantity,



and that it is not what it was some years ago, before the timber was cleared from the hills.

The latter statement is a true one. But it may be said that the estimates have been made with a full knowledge of it. It was formerly customary to say that a water shed was good for a million gallons daily per square mile. You will find estimates of this kind in your own reports made by a no less able man than the late William J. McAlpine. It is now well known, thanks to the investigations of Mr. Desmond Fitz Gerald and others, that no more than about three-fourths of a million gallons can be secured even by the most extensive storage. It will be observed that my estimates are based on about half a million gallons per square mile.

#### METERS.

I shall not feel that I have done my whole duty in this matter until I have mentioned a disagreeable subject.

Cheapest  
plan.

It is undoubtedly a fact that the plan involving the least immediate outlay, and the utmost final economy, is the introduction of the meter system of selling water.

A careful examination of the water rates of more than twelve hundred cities of this country and Canada reveals the fact that there are but eight cities having so low a meter rate as Troy.

Troy's low  
meter rate.

Nevertheless, if all the water furnished was paid for at meter rates, the rates could be materially lowered and still leave the department in better financial condition than now. If the water used last year had been paid for in this way, the receipts of the department would have approximated \$165,000. They were a little more than \$97,000. The expenses were about \$105,000, and this sum could have been met with a meter rate of about three cents.

Rate may be  
lowered.

Such a reduction in meter rates would be of great encouragement to manufacturing and business establishments.



Reduction in  
consumption.

Moreover, this is not the only advantage to be derived from the use of meters. A careful examination of the records of all the cities in this country that use meters extensively does not show one that consumes more than eighty gallons per capita daily. Our consumption and waste is nearly one hundred and fifty gallons per capita.

If any earthly good could come from this lavish use of water, that good might be considered to be worth something, and possibly what it costs. But no argument can be sustained that shows it to be of the slightest good. It is not the use of water that is large and free, but the waste.

It has been said that if water is metered, those who should use water freely will not do so. This is easily governed by a minimum rate sufficient to cover all necessary use. Moreover, it is the business houses and larger dwellings and those with lawns that waste the most water.

I have no hesitation in saying that if one half of the services were metered, beginning with the business houses and larger consumers, the consumption of water in the city would be practically cut in two, and would certainly be reduced one third. The sum total paid would not be increased thereby, but lessened.

Great saving  
to the city.

With this result brought about, not by curtailing use, but by stopping waste, and the meter rate lowered as fast as seemed possible, a very great saving to the city as a whole, to manufacturers particularly, would ensue; and extensive new works might be postponed for several years.

Experience of  
Detroit.

I wish to mention but one instance as an illustration. The city of Detroit in 1887, with a population supplied of 177,258, consumed 13,168,859,808 gallons of water. At that time metering was begun, and while but a small percentage of the services are yet metered, the consumption in 1896 was practically the same as in 1887,

while the population had increased about one hundred thousand.

The engineer to the Water Board writes me under date of May 14th of this year, "So popular has the meter system become here, that we have all we can do to set meters as fast as asked for."

By this economy of waste the city of Detroit now pays  $19\frac{1}{5}$  cents per person for pumping water, as against  $32\frac{1}{3}$  cents in 1887. Its per capita consumption has dropped from about two hundred gallons daily to one hundred and thirty gallons daily. And all this with less than ten per cent. of its services metered.

To meter one half of the services of Troy not now metered will cost probably not more than \$40,000. The care and reading of these meters will entail some slight expense, but it will be but a drop in the bucket as compared with the saving that will result.

I might argue concerning the fairness of the meter system, but feel that it is not necessary. I think that I have said enough to show the great desirability of this system for this city, and I believe that the Board can not do better than to continue as rapidly as possible the introduction of meters.

Very respectfully submitted,  
 WILLIAM G. RAYMOND,  
*Engineer.*

## APPENDIX.

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### I. DAMAGES TO MILL POWERS.

It has been said that every dweller along a stream has a common law right to have that stream continue to flow as it has ever been accustomed to do. This is true. But the law also provides that a municipality may take a portion, or all, of the water of the stream for public use, provided it pays the dwellers along the stream who may be affected by the diversion of the water, suitable sums of money as damages.

The determination of these sums is usually entrusted to a commission acting under the authority of a court. The awards made by such commission may be appealed from to the court.

It will readily be understood that it is absolutely impossible to predict what any commission will judge to be the damage sustained by each of the individuals affected by the diversion of the flow of the stream. It is, however, possible to make an estimate of what will be a fair and reasonable allowance. There are many considerations that enter into such an estimate, and it is not a simple matter to arrive at the conclusion.

In the cases of the Quackenkill, Poestenkill, or Tomhannock streams, it is safe to predict that the damage sustained by the farmers along the streams, who have no mill powers, will be nominal, since not all the water will be diverted, and enough will be left for the watering of stock, and similar farm uses. Moreover, some of these dwellers will be distinctly benefited by a lessening of the spring flood water.

I have on former occasions stated in an informal way, that the methods of arriving at the damages to be awarded the owners of mill privileges for the diversion of a part or all of the flow on which they depend for power have changed in recent years. This statement

has been questioned. I wish to reaffirm what I have said on this subject. So far as I know the law has not changed, but the method of determining the measure of damage has changed.

The following method has prevailed in the past:

A city proposes to build works that will enable it to draw ten millions of gallons of water daily from a stream. Below the point of diversion is a mill power with twenty feet of fall or head. The miller claims that ten millions of gallons daily over twenty feet fall means thirtyfive horse power, good the whole twenty-four hours; or by storage in his mill pond it is good for eightyfour horse power for ten hours daily. At his particular location, out in the country, coal is high, and he estimates that it will cost him, including interest, sinking fund, repairs, fuel, oil, attendance, etc., \$60.00 per horse power per year for ten hours daily. Eighty-four horse power would then cost \$5,040 per annum. This sum capitalized at six per cent. gives \$84,000 as the damage to him for the diversion of the water. He may not be quite so grasping as this, and may admit that his plant is built for only fifty horse power, and that this is all he can use, and that this is what will be destroyed, and hence he asks payment on the basis of fifty horse power. Damages have been awarded on just such estimates as these. It will be observed that no account has been taken of any one of the following points, one or all of which may be pertinent to the particular mill in question:

I. The same reason that makes coal high makes the cost of hauling raw material and finished product high. The miller could operate to better advantage in some other place.

II. His business does not demand eightyfour horse power nor fifty horse power. The unutilized power is certainly not of the same value as that that is used.

III. He needs steam for heating, and possibly also for manufacturing purposes, necessitating the maintenance of a boiler plant. Exhaust steam from an engine will do as well for these purposes, thus reducing the cost of steam power.

IV. The stream is irregular in flow so that to keep up regular power he has been already obliged to install a steam plant. Interest on first cost, a large portion of the repairs and the cost of running for the average time now run should not be chargeable to the city.

V. The stream is irregular, and the mill pond is not large enough to permit the use of the full supply, and perhaps not to give fifty horse power at all times. The power thus wasted should not be charged to the city.

VI. The flow of the stream is irregular, and throughout a considerable portion of the year it is less than ten millions of gallons daily. Only the actual flow stopped should be considered for this period.

VII. The flow of the stream is irregular, and during a considerable portion of the year the flow is so great that the power that it is feasible to develop at the mill will not be in the least lessened by the water taken by the city. For this period no damage should be claimed.

VIII. It costs something, singular as it may seem, to develop water power. Only the difference between the cost of operating by water and steam should be considered. It is true that some of this cost of water power, such as the interest on cost of dams and reservoirs that must go on even though steam be substituted for water, can not be offset in this way.

IX. The average run of water wheels do not develop more than two-thirds of the theoretical power of the water, and the very best do not average more than three-fourths throughout the year. It is clear that no more than this should be charged as net horse power.



X. Last but not least, the business that the miller carries on yields him a net revenue of not to exceed \$1,000 annually, and so far as appears he is getting all out of it that can be gotten. Is he to be paid five times the value of the business for destroying a part or even all of it?

In the past many or all of these considerations, favorable to the city, were omitted in the estimation of the measure of damage. To-day they are considered, together with some other items that are favorable to the mill owner. Different considerations arise for different powers. The single item of transportation has come to mean much more than it once did. Moreover, the laws of trade are such that a manufacturer can not make up a great quantity of goods when power is plenty and hold them till called for. He must run when he gets the orders, and this may be when there is no water to run with. These considerations have done much to lessen the value of power on irregular, small streams. This is evidenced by the number of mills on such streams that have been abandoned as worthless. On the Tomhannock there were formerly a number of mills, flax mills, paper mills, cotton mills, powder keg factory, etc. Now there is practically nothing left of all these; two or three country grist and saw mills being all.

Coming now to a consideration of the streams near Troy we may estimate somewhat as follows:

The assessed value of the less important country privileges that will be affected is about \$12,500. The country assessments are very uncertain as to their relation to true value. Assuming that they represent half value, it would require \$25,000 to purchase them all.

Exclusive of these powers treated in this way, there are other more important powers in the country and city having an aggregate head available of about two



hundred and eighty feet. Each million of gallons daily over this head, assuming it to be well developed is equivalent to about 49.1 horse power throughout the twentyfour hours. Many of the plants run but ten hours, and others run twentyfour hours when there is water to run. With a single exception all of the more important powers are already supplied with steam power. Very few water powers are maintained for less than \$8.00 to \$12.00 per annum per horse power. We will assume \$10.00 in these cases.

Twentyfour-hour power can be furnished by steam to most of these mills for not to exceed \$98.00 per annum per horse power. Add the cost of the interest on the steam plant, the cost of operating a portion of the year, and a part of the sinking fund, etc., to the cost of maintaining the water power, and the difference between water and steam power on these streams will not be more than \$38.00 per annum per net horse power. Some of the mills use water in considerable quantities for manufacturing purposes and due allowance should be made for this.

Ten millions of gallons over a total head of two hundred and eighty feet will represent about 491 twentyfour-hour horse power. With an efficiency of seventyfive per cent, for the wheels, a difference of cost by steam or water of \$38.00 per net horse power, and interest at six per cent., there results a gross valuation of the damage arising to these mills—assuming the diversion of the water to affect them continually—of \$233,225.

There are from four to six months during which the flow is so great that, according to some of the mill people themselves, our diversion of the water of the upper portion of the water shed will not affect them in the least. There are several months of the year during which the flow of the stream is not ten millions of gallons daily, when indeed, including the flow of the

upper storage ponds, it will not exceed four millions daily. Assuming these facts the damage reduces to less than \$100,000 after adding the cost of purchasing the country mills. To take eighteen millions daily will on this basis cost less than \$160,000. It will be many years before this amount of water is required, and hence the present value of the damage should be less than these sums. It should be the amount of the present damage added to a sum which placed at interest now will equal the estimated future damage by the time the future damage will be sustained.

It is thus seen that the estimate of \$125,000 made some years ago is not so far out of the way. The damages actually awarded may of course exceed this amount. It is only an estimate, based on the powers as a whole. But it should be said that a number of these powers heretofore considered important have been idle for a number of years.

It is well to form some idea of the probable cost of such a work as this is before undertaking it, but the best that can be done, unless you desire to settle with these owners on their own terms, is to make an estimate based on the facts known, and on experience elsewhere when details for the case in hand are not available. It is therefore proper to note that in a number of recent cases the awards of the commissions have been somewhat singularly about ten per cent. of the claims of the owners. It is of course well to consider these claims of owners, but what sane man would use this as a basis of settlement? And what owner expects that it will be so used? It is worthy of note in this connection, that in the case of Syracuse, the awards were almost exactly one-tenth of the claims. It is but right to say that these cases are not all finally settled.

Inquiries sent by me to the various owners of privileges along the Poestenkill and Quackenkill have been answered sufficiently to enable me to estimate the probable amount of claims at \$400,000.

It is interesting to note in this connection that the entire assessed valuation of all the mill privileges on both streams, from the mouth of the Poestenkill to the summit of the mountains, including the buildings and real estate appertaining, and including in this more than one hundred acres of land over and above the acreage in the storage ponds in the country, is less than \$290,000.

## II. ESTIMATES.

### PUMPING FROM THE HUDSON RIVER.

#### Low Service—

Two pumps and boilers.....	\$120,000
Extensions to buildings, foundations, etc.	20,000
Pipe line, 38-inch.....	103,000
Engineering and incidentals.....	24,000
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	\$267,000

#### High Service—

1 pump, boilers and fittings.....	\$35,000
Pipe line, 15,000 feet, 18-inch pipe.....	35,000
Engineering, etc.....	7,000
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	\$77,000

### QUACKENKILL.

#### Three millions of gallons daily—

14-inch pipe line, 30,000 feet.....	\$53,000
10-inch pipe, 3,000 feet.....	5,000
Diverting dam.....	22,000
Riparian damages, including Long Pond.	25,000
Engineering, etc.....	10,500
	<hr/>
	\$115,500

## Five millions of gallons daily—

16-inch pipe line .....	\$70,000
12-inch pipe .....	6,000
Diverting dam.....	22,000
Martin dam and reservoir.....	70,000
Riparian damages.....	50,000
Engineering, etc.....	22,000
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	\$240,000

## QUACKENKILL.

## Eight millions of gallons daily—

20-inch pipe line .....	\$101,700
16-inch pipe.....	7,700
Diverting dam... ..	22,000
Martin-Dunham reservoir.....	70,000
Hakes reservoir .....	70,000
Shaver Pond.....	20,000
Mill damages, etc.....	65,000
Engineering, etc.....	36,000
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	\$392,400

## POESTENKILL.

## Five millions of gallons daily—

20-inch pipe line, 46,000 feet.....	\$155,000
16-inch pipe, 2,000 feet.....	6,000
Diverting dam at Barberville.....	30,000
Bonesteel reservoir.....	30,000
Cottrell flat reservoir .....	35,000
Mill damages, etc.....	45,000
Draining marshes.....	20,000
Engineering, etc.....	32,000
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	\$353,000

## POESTENKILL.

Ten millions of gallons daily—

24-inch pipe line.....	\$200,000
18-inch pipe.....	8,000
Diverting dam.....	30,000
Bonesteel and Cottrell reservoirs.....	65,000
Ives Corners reservoir .....	138,000
Columbia diverting dam and conduit....	50,000
Draining marshes.....	20,000
Riparian damages, etc.....	70,000
Engineering, etc.....	58,000
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	\$639,000

## TOMHANNOCK CREEK.

Dam .....	\$120,450
Land and mill damage.....	105,000
Clearing the reservoir.....	156,000
Road changes.....	15,000
Conduit line, 34-inch steel, 61,000 feet..	320,000
Engineering, etc.....	71,550
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	\$788,000

## REPORT OF DR. WILLIAM P. MASON.

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TROY, N. Y., May 10th, 1897.

BOARD OF WATER COMMISSIONERS, TROY, N. Y.

GENTLEMEN—

Following your instructions I took samples of water, on May 1st, from the main stream of the Tomhannock just below the entrance of Otter Creek, and also from Otter Creek itself just short of its mouth. The results of the examination of these samples I enclose herewith.

Both the waters are good and suitable for city supply. Let it be said that there is constant danger of drainage entering from the large farm-yard and buildings now located near the point where the samples were taken, but this need cause no concern, because in the event of the Tomhannock being selected for supplying the city of Troy, the site of the said farm buildings would be covered by the necessary reservoir, and they would consequently have to be removed and the soil stripped whereon they now stand.

Yours respectfully,

WM. P. MASON.

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## ANALYSIS OF WATER

From Otter Creek near its mouth; sample taken May 1, 1897.

## RESULTS IN PARTS PER MILLION.

Free ammonia.....	.045
Albuminoid ammonia.....	.079
Chlorine.....	1.5
Nitrogen in nitrates.....	.45



Nitrogen in nitrites.....	trace
Oxygen required to oxidize organic matter at 212° F.....	2 65
Hardness (as parts of Ca CO 3).....	soft
Total solids.....	65.
Bacteria per cubic centimetre.....	246.

Remarks.—No odor nor taste; no sediment; very slight greenish-brown color, when seen through a depth of two feet.

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From Tomhannock, below the mouth of Otter Creek;  
sample taken May 1, 1897.

RESULTS IN PARTS PER MILLION.

Free ammonia.....	.03
Albuminoid ammonia.....	.105
Chlorine.....	1.5
Nitrogen in nitrates.....	.4
Nitrogen in nitrites.....	trace
Oxygen required to oxidize organic matter at 212° F.....	2.36
Hardness (as parts of Ca CO 3).....	soft
Total solids.....	57.
Bacteria per cubic centimetre.....	370.

Remarks.—No odor nor taste; no sediment; very slight greenish-brown color, when seen through a depth of two feet.

## REPORT OF ENGINEER, ELNATHAN SWEET.

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ALBANY, N. Y., June 17, 1897.

BOARD OF WATER COMMISSIONERS, TROY, N. Y.

GENTLEMEN—

I have visited with Professor Raymond the site of a proposed reservoir on the Tomhannock creek, extending from near East Schaghticoke to Raymertown, N. Y., and have examined and revised with him the various plans and estimates he has prepared for submission to you covering all the readily available methods for increasing the water supply of your city.

These estimates, which I believe to be reliable and sufficient (more liberal perhaps in stating the probable cost of the gravity plans than of that for pumping and filtration), clearly show that pure water can be much more economically supplied to your citizens by either of the plans for a gravity plant than by pumping and filtration.

These estimates also indicate very clearly that the combination of the Quackenkill and Tomhannock offers the simplest and cheapest method for an abundant and permanent water supply for Troy.

The character of the watersheds and the results of chemical and biological analyses insure excellence of quality in water supplied by both these streams. The Quackenkill is only relied on to supply the small population within the limits of your high service, and there can be no doubt that with very limited storage it will always supply the requirements of this service; while the Tomhannock, provided with the proposed storage reservoir holding over 5,000,000,000 gallons supplied from a watershed of more than sixty square miles, will

furnish a reliable water supply for more than two hundred thousand people. It is at a sufficient elevation to supply by gravity seven-eighths of your consumers, and is of sufficient capacity to enable you for many years to supply neighboring communities with water.

I am firmly convinced that this combined source of gravity supply is not only the most economical solution of your water problem, but that the water derived from it will be permanently of better quality than can be obtained by the mechanical filtration of water pumped from the Hudson river. In fact I know of no American city where the facility of securing a nearly perfect gravity supply is so great, or where the disparity in relative cost between a gravity and pumped supply so greatly favors the former.

Very respectfully yours,

E. SWEET.









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